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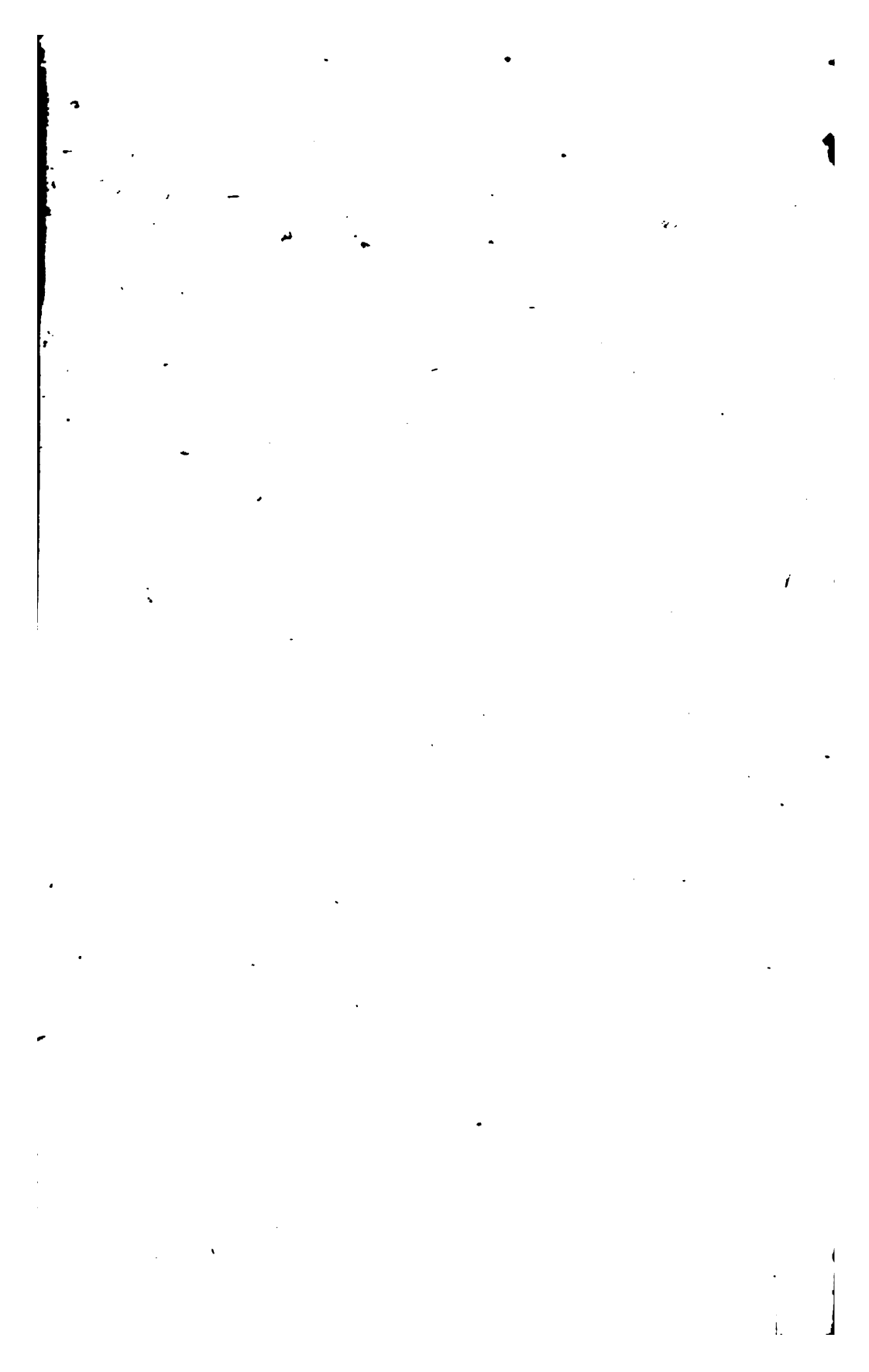
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VOL. XI.

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SMITHSONIAN

MISCELLANEOUS COLLECTIONS.

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VOL. XI.

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"EVERY MAN IS A VALUABLE MEMBER OF SOCIETY WHO BY HIS OBSERVATIONS, RESEARCHES,  
AND EXPERIMENTS PROCURES KNOWLEDGE FOR MEN."—SMITHSON.

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WASHINGTON:  
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JOSEPH HENRY,  
*Secretary S. I.*

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SMITHSONIAN MISCELLANEOUS COLLECTIONS.

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ARRANGEMENT

OF THE

FAMILIES OF MAMMALS.

WITH ANALYTICAL TABLES.

PREPARED FOR THE SMITHSONIAN INSTITUTION.

BY

THEODORE GILL, M.D., Ph.D.



WASHINGTON:

PUBLISHED BY THE SMITHSONIAN INSTITUTION.

NOVEMBER, 1872.



## ADVERTISEMENT.

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THE following list of families of Mammals, with analytical tables, has been prepared by Dr. THEODORE GILL, at the request of the Smithsonian Institution, to serve as a basis for the arrangement of the collection of Mammals in the National Museum; and as frequent applications for such a list have been received by the Institution, it has been thought advisable to publish it for more extended use. In provisionally adopting this system for the purpose mentioned, the Institution, in accordance with its custom, disclaims all responsibility for any of the hypothetical views upon which it may be based.

JOSEPH HENRY,  
*Secretary, S. I.*

SMITHSONIAN INSTITUTION,  
WASHINGTON, October, 1872.





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ARRANGEMENT  
OF  
FAMILIES AND SUB-FAMILIES  
OF MAMMALS.

[Adopted provisionally by the Smithsonian Institution.]

N. B.—The Fossil Families are indicated by Italics.

---

CLASS A.—MAMMALIA.  
SUB-CLASS PLACENTALIA.

SUPER-ORDER EDUCABILIA.

(GYRENCEPHALA — MEGASTHENA + ARCHENCEPHALA —  
ARCHONTIA.)

(PRIMATE SERIES.)

ORDER I.—PRIMATES.

SUB-ORDER ANTHROPOIDEA.

(*Bimana.*)

1. Hominidae = Anthropini, Huxl., M. T. & G.,  
1864, i, 153.

(*Simiae.*)

(*Simiae catarrhinae.*)

2. Simiidae = Anthropomorpha, Huxl., M.  
T. & G. 1864, i, 648.

- a. Simiinae = Simiina, Gray, M., L., & Fr.-eat. B., 6.
- b. Hylobatinae = Hylobatina, Gray, M., L., & Fr.-eat. B., 9.
- 3. Cynopithecidae = Cynopithecini, Huxl., M. T. & G., 1864, i, 671.
  - a. Semnopithecinae = Sub-Family II, Mart., Man and Monkeys, 445.
  - b. Cynopithecinae = Sub-Family III, Mart., Man and Monkeys, 503.

*(Simiae platyrrhinae.)*

- 4. Cebidae = Platyrrhini, Huxl., M. T. & G., 1864, ii, 93.
  - a. Mycetinae = Mycetinae, Miv., P. Z. S., 1865, 547.
  - b. Cebinae = Cebinae, Miv., P. Z. S., 1865, 547.
  - c. Nyctipithecinae = Nyctipithecinae, Miv., P. Z. S., 1865, 547.
  - d. Pitheciinae = Pitheciinae, Miv., P. Z. S., 1865, 547.
- 5. Mididae = Arctopithecini, Huxl., M. T. & G., 1864, ii, 124.

SUB-ORDER PROSIMIAE.

*(Lemuroidea.)*

- 6. Lemuridae = Lemuridae, Geoff., Cat. Primates, 66.

- a. Indrisinae = Indrisinae, Miv., P. Z. S.,  
1866, 151.
- b. Lemurinae = Lemurinae, Miv., P. Z. S.  
1867, 960.
- c. Nycticebinae = Nycticebinae, Miv., P. Z.  
S., 1864, 643.
- d. Galagininae = Galagininae, Miv., P. Z. S.,  
1864, 645.
7. Tarsiidae = Tarsidae, Geoff., Cat. Pri-  
mates, 83.

(*Daubentonioidea.*)

8. Daubentoniidae = Cheiromyidae, Geoff., Cat.  
Primates, 85.

(FERAL SERIES.)

ORDER II.—FERÆ.

SUB-ORDER FISSIPEDIA.

(*Aeluroidea.*)

(*Aeluroidea typica.*)

9. Felidae = Felidae, Fl., P. Z. S., 1869,  
15-18.
- a. Felinae = Felidae, § 1, Gray, P. Z. S.,  
1867, 261.
- b. Guepardinae = Felidae, § 2, Gray, P. Z. S.,  
1867, 277.

c. *Machaerodontinae* > Felinae, Burm., A. M. P. B.  
-A. i, 122-138.

10. Cryptoproctidae = Cryptoproctidae, Fl., P. Z. S., 1869, 22.

(*Aeluroidea hyaeniformia.*)

11. Protelidae = Protelidae, Fl., P. Z. S.,  
1869, 27, 474.

12. Hyaenidae = Hyaenidae, Fl., P. Z. S.,  
1869, 26.

(*Aeluroidea viverriformia.*)

13. Viverridae = Viverridae, Fl., P. Z. S.,  
1869, 18.

a. Viverrinae { Viverrina, } Gray, C. P. &  
                  { Genettina, } E. M., 46, 49.

b. Prionodontinae = Prionodontina, Gray, C. P. & E. M., 52.

c. Galidiinae = Galidiina, Gray, C. P. & E. M., 55.

d. Hemigalinae = Hemigalina, Gray, C. P. & E. M., 56.

e. Arctictidinae = Arctictidina, Gray, C. P. & E. M., 57.

f. Paradoxurinae = Paradoxurina, Gray, C. P. & E. M., 59.

g. Cynogalinae = Cynogalina, Gray, P. Z. S.,  
1867, 521. = *Cynogalidae.*

- h. Herpestinae = Herpestina, Gray, C. P. & E. M., 144. (h-i < *Herpestidae*.)
- i. Cynictidinae = Cynictidina, Gray, C. P. & E. M., 169.
- j. Rhinogalinae = Rhinogalina, Gray, C. P. & E. M., 172. j-k < *Rhinogalidae*.
- k. Crossarchinae < Crossarchina, Gray, C. P. & E. M., 176.
14. Eupleridae = Eupleréens, Doy., A. S. N., 2e s., iv, 1835, Z., 281.

(*Cynoidea*.)

15. Canidae = Canidae, Fl., P. Z. S., 1869, 23.
- a. Caninae = Canidae, Gray, C. P. & E. M., 178.
- b. Megalotinae = Megalotidae, Gray, C. P. & E. M., 210.

(*Arctoidea*.)

(*Arctoidea musteliformia*.)

16. Mustelidae = Mustelidae, Fl., P. Z. S., 1869, 11-14.
- a. Mustelinae = Mustelina, Gray, C. P. & E. M., 81.
- b. Melinae = Melina, Gray, C. P. & E. M., 122. (b-f < *Melinidae*.)

- c. Mellivorinae = Mellivorina, Gray, C. P. & E. M., 131.
- d. Mephitinae = Mephitina, Gray, C. P. & E. M., 133.
- e. Zorillinae = Zorillina, Gray, C. P. & E. M., 139.
- f. Helictidinae = Helictidina, Gray, C. P. & E. M., 141.
- g. Lutrinae = Lutrina, Gray, C. P. & E. M. 100. (g-h < *Mustelidae*.)
- h. Enhydrinae = Enhydrina, Gray, C. P. & E. M., 118.

(*Arctoidea typica*.)

- 17. Ursidae = Ursidae, Fl., P. Z. S., 1869, 6-9.

(*Arctoidea procyoniformia*.)

- 18. Aeluridae = Ailuridae, Fl., P. Z. S., 1869, 11, 36.
- 19. Cercoleptidae > Procyonidae, Fl., P. Z. S., 1869, 9, 32.
- 20. Procyonidae > Procyonidae, Fl., P. Z. S., 1869, 9, 32.
  - a. Nasuinae = Nasuidae, Gray, C. P. & E. M., 238.
  - b. Procyoninae = Procyonidae, Gray, C. P. & E. M., 242.



21. Bassarididae = Bassaridae, Gray, C. P. & E.  
M., 245.

(*Fissipedia sedis incertae.*)

22. *Simocyonidae* = *Famille aujourd'hui éteinte*,  
Gaudry, (320), 37.

23. *Arctocyonidae*, < *Arctocyoninae*, Giebel, Säugethiere, 755.

?

24. *Hyaenodontidae* = *Hyaenodontidae*, Leidy, Ext.  
Mamm. Dak. & Neb., 38.

( ♀                      ♂ )

#### SUB-ORDER PINNIPEDIA.

(*Phocoidea.*)

25. Otariidae = Otariadae, Allen, B. M. C. Z.,  
ii, 1; Gill, A. N., iv., 675.

26. Phocidae = Phocidae, Gill, C. E. I., 1866,  
5, 8.

- a. Phocinae = Phocinae, Gill, C. E. I.,  
1866, 5.

- b. Cystophorinae = Cystophorinae, Gill, C. E.  
I., 1866, 6.

- c. Stenorhynchinae = Stenorhynchinae, Gill, C.  
E. I., 1866, 6.

(*Rosmaroidea.*)

27. Rosmaridae = Rosmaridae, Gill, C. E. L,  
1866, 7.

(UNGULATE SERIES.)

ORDER III.—UNGULATA.

SUB-ORDER ARTIODACTYLI.

(*Pecora s. Ruminantia.*)

(*Pecora ? edentata.*)

- 27a. *Chalicotheriidae* = *Chalicotherium*, Falc., Pal.  
Mem., i, 190, 208, 523.

(*Pecora tylopoda s. phalangigrada.*)

28. Camelidae = Camélidés, Gerv., Mamm. ii.  
223.

(*Pecora unguligrada.*)

(*Pecora unguligrada typica.*)

(*Girafioidea.*)

29. Giraffidae = Girafidés, Gerv. Mamm. ii,  
210.

(*Booidea.*)

(*Booidea typica.*)

30. Saigiidae = Saigiinae, Mur., P. Z. S.,  
1870, 451.

31. Bovidae = Bovidés, Gerv., Mamm. ii,  
174.

- a. Bovinae = Bovina, Rutim., N. D. S. G.  
N., xxiii, 21.

- b. Ovibovinae < Boveae, Gray, Mamm., iii,  
15.
- c. Antilopinae { Antilopeae, } G. M., iii,  
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- d. Caprinae = Capreae, Gray, Mamm., iii,  
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- e. Ovinae = Oveae, Gray, Mamm., iii,  
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32. Antilocapridae = Antilocapridae, Mur., P. Z. S.,  
1870, 334.

(*Booidea cerviformia.*)

33. Cervidae = Cervidae, Scl., P. Z. S., 1870,  
114.
- a. Cervinae = Cervinae, Scl., P. Z. S.,  
1870, 114.
- b. Cervulinae = Cervulinae, Scl., P. Z. S.,  
1870, 115.
- c. Moschinae = Moschinae, Scl., P. Z. S.,  
1870, 115.

(*Pecora unguigrada traguloidea.*)

34. Tragulidae = Tragulidae, A. Milne Edw., A.  
S. N., 5e s., ii, Z., 1864, 157.

(*Pecora unguigrada incertae sedis.*)

35. *Sivatheriidae* = *Sivatherium*, Falc., Pal. Mem.,  
i, 247.

36. *Helladotheriidae* = *Famille aujourd'hui éteinte*,  
Gaudry, A. F. Att. (321), 252.

(*Pecora dentata.*)

(*Oreodontoidea.*)

37. *Oreodontidae.*

a. *Oreodontinae* = *Oreodontidae*, Leidy, Ext.  
Mamm. Dak. & Neb., 71.

b. *Agrichoerinae* = *Agrichoeridae*, Leidy, Ext.  
Mamm. Dak. & Neb., 131.

(*Anoplotheroidea.*)

38. *Anoplotheriidae* = *Anoplotheriidae*, Leidy, Ext.  
Mamm. Dak. & Neb., 206.

39. *Dichobunidae* = *Moschidae* § *Dichobunina*,  
Turn, P. Z. S., 1849, 158.

(*Omnivora.*)

(*Merycopotamoidea.*)

40. *Merycopotamidae* = *Merycopotamus*, Falc., Pal.  
Mem., ii, 407.

(*Hippopotamoidea.*)

41. *Hippopotamidae* = *Hippopotamidae*, Gray, C.  
P. & E. M., 356.

a. *Hippopotaminae* = *Hippopotamus*, Falc., Pal.  
Mem., i, 130.

b. *Choeropsinae* = *Choeropsis*, A. Milne Ed.,  
R. H. N. M., 43.

*(Setifera.)**(Setifera suiformia.)*

42. Phacochoeridae = Phacochoeridae, Gray, B. M.,  
352.

43. Suidae = Suidae, Gray, C. P. & E. M.,  
327.

*(Setifera dicotyliformia.)*

44. Dicotylidae = Dicotylidae, Gray, C. P. & E.  
M., 350.

*(Anthracotheroidea.)*

45. *Anthracotheriidae* < Hippopotamidae, Turn., P. Z.  
S., 1849, 157.

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Mamm. Dak. & Neb., 202.

b. *Anthracotheri-* < *Anthracotheriidae*, L'dy, Ex.  
*inae* Mamm. Dak. & Neb., 202.

## SUB-ORDER PERISSODACTYLI.

*(Anchippodontoides.)*

45a. *Anchippodontidae* = Trogosus, Leidy, P. A. N.  
S., Phil., 1871, 114.

*(Solidungula.)*

46. Equidae = Equidae, Gray, C. P. & E. M.,  
2 262.

47. *Anchitheriidae* = *Anchitheridae*, Leidy, Ext.  
Mamm. Dak. & Neb., 302.

(*Multungula.*)

(*Rhinocerotoida.*)

(*Rhinocerotoida rhinocerotiformia.*)

48. *Rhinocerotidae* = *Rhinocerotidae*, Gray, C. P. &  
E. M., 295.

(*Rhinocerotoida macraucheniiformia.*)

49. *Macraucheniidae* = *Macrauchenia*, Burm., A. M.  
B.-A., i, 32, 1864.

50. *Palaeotheriidae* < *Palaeothérioides*, Pictet, Pa-  
léont., 2e ed., i, 309-313.

(*Tapiroidea.*)

51. *Tapiridae* = *Tapiridae*, Gray, C. P. & E.  
M., 252.

52. *Lophiodontidae* < *Tapiroïdes*, Pictet, Paléont.,  
2e ed., i, 301.

(*Pliolophoida.*)

53. *Pliolophidae* = *Pliolophus*, Owen, Pal.,  
1860, 325.

(*Perissodactyli? incertae sedis.*)

54. *Elasmotheriidae* Rhinocéroïdes, Pictet, Pa-  
léont., 2e ed., i, 294.

## ORDER IV.—TOXODONTIA.

55. *Nesodontidae* = *Nesodon*, Owen, Ph. T.,  
1853, 291.  
56. *Toxodontidae* = *Toxodon*, Burm, A. M.  
B.-A., i, 254, 1864.

## ORDER V.—HYRACOIDEA.

57. Hyracidae = Hyracidae, Gray, C. P. & E.  
M., 279.

## ORDER VI.—PROBOSCIDEA.

58. Elephantidae < Proboscideae, Falc., Pal.  
Mem., ii, 1868.  
Elephantinae = Elephantidae, Gray, C. P. &  
E. M., 358.  
*Mastodontinae* = *Mastodontidae*, Gray, C. P. &  
E. M., 359.  
59. *Dinotheriidae* = [*Dinothériiides*,] Gaudry, An.  
F. Att., 321, 162.



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## ORDER VII.—SIRENIA.

(*Halicoroidea*.)

60. *Halitheriidae* < Halicorida, Brandt, Symb.  
Siren., ii, (f. 3,) 344.

61. Halicoridae < Halicorida, Brandt, Symb.  
Siren., ii, (f. 3,) 344.
62. Rhytinidae < Halicorida, Brandt, Symb.  
Siren., ii, (f. 3,) 344.

(*Manatoidea.*)

63. Trichechidae = Manatida, Brandt, Symb.  
Siren., ii, (f. 3,) 343.

ORDER VIII.—CETE.

SUB-ORDER ZEUGLODONTES.

64. *Basilosauridae* < *Zeuglodontes*, VanBen., Mém.  
Ac. R. Belg., xxxv, 1865.
65. *Cynorcidæ* = *Cynorcidæ*, Cope, P. A. N. S.,  
1867, 144.

SUB-ORDER DENTICETE.

(*Delphinoidea.*)

(*Delphinoidea platanistiformia.*)

66. Platanistidae < Platanistidae, Fl., Trans. Zool.  
Soc., vi, 113, 1867.
67. Iniidae < Platanistidae, Fl., Trans.  
Zool. Soc., vi, 114, 1867.

(*Delphinoidea typica.*)

68. Delphinidae > Delphinidae, Fl., Trans. Zool.  
Soc., vi, 113, 1867.



- a. Pontoporiinae = Pontoporiinae, Gill, C. E. I., vi., 124, 1871.
- b. Delphinapterinae = Beluginae, Fl., Trans. Zool. Soc., vi, 115, 1867.
- c. Delphininae < Delphininae, Fl., Trans. Zool. Soc., vi, 115, 1867.
- d. Globiocephalinae < Delphininae, Fl., Trans. Zool. Soc., vi, 115, 1867.

(*Delphinoidea ziphiiformia.*)

- 69. Ziphiidae = Ziphioides, Fisch, N. A. M. H. N. P., iii, 41, 1867.
- a. Ziphiinae = Ziphiinae, Gill, C. E. I., vi, 124, 1871.
- b. Anarnacinae = Anarnacinae, Gill, C. E. I., vi, 124, 1871.

(*Physeteroidea.*)

- 70. Physeteridae = Physeteridae, Gill, A. N., iv, 727, 1871.
- a. Physeterinae = Physeterinae, Gill, A. N., iv, 732, 1871.
- b. Kogiinae = Kogiinae, Gill, A. N., iv, 732, 1871.

(*Denticete incertae sedis.*)

- 71. *Rhabdosteidae* = *Rhabdosteidae*, Gill, C. E. I., vi, 123, 1871.

## SUB-ORDER MYSTICETE.

72. Balaenopteridae = Balaenopteridae, Fl., Proc.  
Zool. Soc., 1864, 291.
- a. Agaphelinae = Agaphelinae, Gill, C. E. I.,  
vi, 124, 1871.
- b. Megapterinae = Megapterinae, Fl., Proc.  
Zool. Soc., 1864, 391.
- c. Balaenopterinae = Balaenopterinae, Fl., Proc.  
Zool. Soc., 1864, 391.
73. Balaenidae = Balaenidae, Fl., Proc. Zool.  
Soc., 1864, 389.

## SUPER-ORDER INEDUCABILIA.

(LISSENCEPHALA Owen—MICROSTHENA Dana.)

(INSECTIVOROUS SERIES.)

## ORDER IV.—CHIROPTERA.

## SUB-ORDER ANIMALIVORA.

*(Hæmatophilina.)*

74. Desmodidae = Haematophilini, Huxl., P. Z.  
S. L., 1865, 386.

*(Histiophora.)*

75. Phyllostomidae > Phyllostomidae, Gray, P. Z.  
S. L., 1866, 111.
76. Mormopidae = Mormopes, Car., Handb. Zool.,  
i, 83.

77. Rhinolophidae < Rhinolophidae, Gray, P. Z.  
S. L., 1866, 81.
78. Megadermidae < Megadermata, Pet., M. P. A.  
W. Berlin, 1865, 256.
- a. Vampyrinae = Vampiri, Pet., M. P. A. W.  
Berlin, 1865, 503.
- b. Glossophaginae = Glossophagae, Pet., M. P.  
A. W. Berlin, 1868, 361.
- c. Stenoderminae = Stenodermata, Pet., M. P. A.  
W. Berlin, 1865, 356, 524.

(*Gymnorhina.*)

79. Vespertilionidae = Vespertiliones, Pet., M. P. A.  
W. Berlin, 1865, 258, 524.
- a. Vespertilioninae = Vespertilioniens, Gerv., An.  
Am. S. Cast.—Mamm., 74.
- b. Nycticejinae = Nycticéins, Gerv., Mamm.,  
74.
80. Molossidae = Molossi, Pet., M. P. A. W.  
Berlin, 1865, 573.
81. Noctilionidae = Brachyura, Pet., M. P. A. W.  
Berlin, 1865, 257.
- a. Noctilioninae = Noctilionins, Gerv., An. Am.  
S. Cast.—Mamm., 52.
- b. Emballonurinae = Noctilionins, Gerv., An. Am.  
S. Cast.—Mamm., 62.

- c. Furiinae = Furia, Gerv., An. Am. S.  
Cast.—Mamm., 69.

SUB-ORDER FRUGIVORA.

82. Pteropodidae = Pteropi, Pet., M. P. A. W.  
Berlin, 1867, 320, 867.

ORDER VI.—INSECTIVORA.

SUB-ORDER DERMOPTERA.

83. Galeopithecidae = Galeopithecidae, Miv., J. A. &  
P., ii, 1868, 124.

SUB-ORDER INSECTIVORA VERA.

(*Soricoidea.*)

84. Talpidae = Talpidae, Miv., J. A. & P., ii,  
1868, 150.  
a. Talpinae = Talpina, Miv., J. A. & P.,  
ii, 1868, 151.  
b. Myogalinae = Myogalina, Miv., J. A. &  
P., ii, 1868, 152.  
85. Soricidae = Soricidae, Miv., J. A. & P., ii,  
1868, 153.

(*Erinaceoidea.*)

86. Erinaceidae = Erinaceidae, Miv., J. A. & P.,  
ii, 1868, 146.  
a. Erinaceinae = Hérissons, Gerv., H. N.  
Mamm., i, 229.

- b. *Gymnurinae* = *Gymnures*, Gerv., H. N.  
Mamm., i, 231.

(*Centetoidea.*)

87. *Centetidae* = *Centetidae*, Miv., J. A. & P.,  
ii, 1868, 147.  
a. *Centetinae* = *Tanrecs*, Gerv., H. N.  
Mamm., i, 233.  
b. *Solenodontinae* = *Solénodontes*, Gerv., H. N.  
Mamm., i, 246.  
88. *Potamogalidae* = *Potamogalidae*, Allm., T. Z.  
S., vi, 149, 1-16.

(*Chryschloridoidea.*)

89. *Chrysochlorididae* = *Chrysochloridae*, Miv., J. A. &  
P., ii, 1868, 150.

(*Macroscelidoidea.*)

90. *Macroscelididae* = *Macroscelididae*, Miv., J. A.  
& P., ii, 1868, 143.  
a. *Rhynchocytoninae* = *Rhynchocytons*, Gerv., H.  
N. Mamm., i, 238.  
b. *Macroscelidinae* = *Macroscélidiens*, Gerv., H.  
N. Mamm., i, 235.  
91. *Tupayidae* = *Tupaiidae*, Miv., J. A. & P.,  
ii, 1868, 145.

(*Insectivora incertae sedis.*)

92. *Leptictidae* < *Leptictis*, Leidy, Ext. Mamm.  
Dak. & Neb., 345.

## (RODENT SERIES.)

## ORDER GLIRES.

## SUB-ORDER SIMPLICIDENTATI.

*(Lophiomyoidea.)*

93. Lophiomyidae = Lophiomides, A. M. Edw., N.  
A. M. H. N. P., iii, 114.

*(Myoidea.)*

94. Pedetidae = Pedetina, Car., Handb. Zool.,  
i, 101.
95. Dipodidae = Dipodina, Car., Handb. Zool.,  
i, 101.
96. Jaculidae = Jaculina, Car., Handb. Zool.,  
i, 101.
97. Muridae = Muridés, Gerv., H. N. Mamm.,  
i, 417.
- a. Spalacinae = Rhizodontes a. Spalacini,  
Br't., S. R., 307.
- b. Georhychinae = Rhizodontes b. Georhy-  
chini, Br't., S. R., 308.
- c. Murinae = Murini, Lillj., Gnag.  
Däggdj., 12.
- d. Siphneinae = Pristodontes b. Macro-  
nyches, Br't., S. R., 309.
- e. Ellobiinae = Pristodontes a. Brachyo-  
nyches, Br't., S. R., 309.

f. Arvicolinae = Arvicolini, Lillj., Gnag.  
Däggdj., 22.

(*Myoxoidea.*)

98. Myoxidae = Myoxidae, Lillj., Gnag.  
Däggdj., 31.

(*Sacomyoidea.*)

99. Saccomyidae = Saccomyinae, Bd., M. N. A.,  
405. (e Saccomyidiis.)

100. Geomyidae = Sciurospalacoïdes, Br't., S. R.,  
301.

(*Castoroidea.*)

101. Castoridae = Castoridae, Morgan, Am.  
Beaver, 186.

(*Sciuroidea.*)

102. Sciuridae = Sciurida, Car., Handb. Zool.,  
i, 96.

a. Sciurinae = Campsiurina, Car., Handb.  
Zool., i, 96.

b. Arctomyinae = Arctomyina, Car., Handb.  
Zool., i, 97.

(*Anomaluroidea.*)

103. Anomaluridae = Anomalurina, Car., Handb.  
Zool., i, 98.

*(Haploodontoidea.)*

104. Haploodontidae = Haploodontidae, Lillj., Gnag.  
Däggdj., 41.

*(Hystricoidea.)*

105. Spalacopodidae = Spalacopodidae, Lillj., Gnag.  
Däggdj., 44.
- a. Octodontinae      × Octodontina, Waterh., N.  
H. Mamm., ii, 242.
  - b. Ctenodactylinae   < Octodontina, Waterh., N.  
H. Mamm., ii, 242.
  - c. Echimyinae        < Echimyina, Waterh., N. H.  
Mamm., ii, 286.
  - d. Cercolabinae      = Cercolabina, Waterh., N.  
H. Mamm., ii, 484, (398).
106. Hystricidae      < Hystrichina, Car., Handb.  
Zool., i, 109.
107. Dasyproctidae   = Dasyproctina, Car., Handb.  
Zool., i, 110.
- a. Dasyproctinae    = Dasyproctiens, Gerv., H. N.  
Mamm., 327.
  - b. Coelogenyinae    = Célogényens, Gerv., H. N.  
Mamm., 325.
108. Caviidae         < Caviina, Car., Handb. Zool.,  
i, 110.
109. Hydrochoeridae < Caviina, Car., Handb. Zool.,  
i, 110.



110. Chinchillidae = Chinchillidae, Lillj., Gnag.  
Daggdj., 42.
- a. Chinchillinae = Orobii *seu* Eriomyes monti-  
colae, Br't., S. R., 317.
- b. Lagostominae = Homalobii *seu* Eriomyes  
planicolae, Br't., S.R., 317.

## SUB-ORDER DUPLICIDENTATI.

111. Lagomyidae = Lagomyidae, Gray, A. & M.  
N. H., xx, 219, 1867.
112. Leporidae = Leporidae, Gray, A. & M.  
N. H., xx, 219, 1867.

## ORDER XIII.—BRUTA.

## SUB-ORDER VERMILINGUA.

113. Myrmecophagi- = Myrmecophagidae, Gray, C.  
dae P. & E. M., 390.
- a. Myrmecophaginae { Myrmecophaga, } Gray, C. P.  
{ Tamandua, } & E. M., 390.
- b. Cyclothurinae = Cyclothurus, Gray, C. P.  
& E. M., 392.

## SUB-ORDER SQUAMATA.

114. Manididae = Manididae, Gray, C. P. & E.  
M., 366.

## SUB-ORDER FODIENTIA.

115. Orycteropodidae = Orycteropodidae, Gray, C. P.  
& E. M., 389.

## SUB-ORDER TARDIGRADA.

116. *Bradypodidae* = *Bradypodidae*, Gray, C. P. & E. M., 362
- a. *Bradypodinae* { *Bradypus*, } Gray, 363,  
                          { *Arctopithecus*, } 364.
- b. *Choloepodinae* = *Choloepus*, Gray, C. P. & E. M., 363.
117. *Megatheriidae* = *Gravigrada*, Burm., A. M. P. B. A., i, 32.
- a. *Megatheriinae*
- b. *Mylodontinae*

## SUB-ORDER LORICATA.

118. *Dasypodidae* > *Dasypodidae*, Gray, P. Z. S., 1865, 360.
- a. *Dasypodinae* < *Dasypodina*, Gray, P. Z. S., 1865, 360.
- b. *Tatusiinae* < *Dasypodina*, Gray, P. Z. S., 1865, 360.
- c. *Xenurinae* < *Dasypodina*, Gray, P. Z. S., 1865, 365.
- d. *Tolypeutinae* = *Tolypeutina*, Gray, P. Z. S., 1865, 365.
119. *Chlamydophori-* = *Chlamyphoridae*, Gray, P. Z. S., 1865, 387.  
      *dae*
120. *Hoplophoridae* = *Hoplophoridae*, Huxl., Phil. Trans., clv, 31.

121. *Ancylotheriidae* = *Famille aujourd'hui éteinte*,  
Gaudry, An. foss. d'Att.,  
i, 129, 321.

## SUB-CLASS DIDELPHIA.

### ORDER XIV.—MARSUPIALIA.

#### SUB-ORDER RHIZOPHAGA.

122. *Phascolomyidae* = *Phascolomyidae*, Waterh., N.  
H. Mamm., i, 241.

#### SUB-ORDER SYNDACTYLI.

(*Poephaga.*)

123. *Macropodidae* = *Macropodidae*, Waterh., N. H.  
Mamm., i, 50.

(*Carpophaga.*)

124. *Tarsipedidae* = *Tarsipédidés*, Gerv., Mamm.,  
ii, 277.

125. *Phalangistidae* = *Phalangistidae*, Owen, T. Z.  
S., ii, 332.

a. *Petaurinae* = *Petauristins*, Gerv., H. N.,  
Mamm., ii, 276.

b. *Phalangistinae* = *Phalangistins*, Gerv., H. N.  
Mamm., ii, 274.

126. *Phascolarctidae* = *Phascolarctidae*, Owen, T. Z.  
S., ii, 332.

(*Diprotodontoidea.*)

127. *Diprotodontidae* < Diprotodon, Owen, Palæont.,  
394–395.
128. *Thylacoleonidae* < Thylacoleo, Fl., Jour. Geol.  
S. L., xxiv, 1868, 307.

(*Entomophaga.*)

129. *Peramelidae* = *Peramelidae*, Waterh., N. H.  
Mamm., i, 354.
- a. *Choeropodinae*
- b. *Peramelinae*

SUB-ORDER DASYUROMORPHIA.

130. *Dasyuridae* = *Dasyuridae*, Owen, T. Z. S.,  
ii, 332.
- a. *Sarcophilinae*
- b. *Dasyurinae*
- c. *Phascogalinae*

131. *Myrmecobiidae* = *Ambulatoria*, Owen, T. Z. S.,  
ii, 332.

SUB-ORDER DIDELPHIMORPHIA.

132. *Didelphididae* = *Didelphididae*, Waterh., N. H.  
Mamm., ii, 462.

## MARSUPIALIA INCERTAE SEDIS.

133. *Plagiaulacidae* = *Plagiaulax*, Falc., Journ.  
Geol. S. L., 1862, 348.
134. *Dromatheriidae* = *Dromatherium*, Owen, Pal.,  
302.

## SUB-CLASS ORNITHODELPHIA.

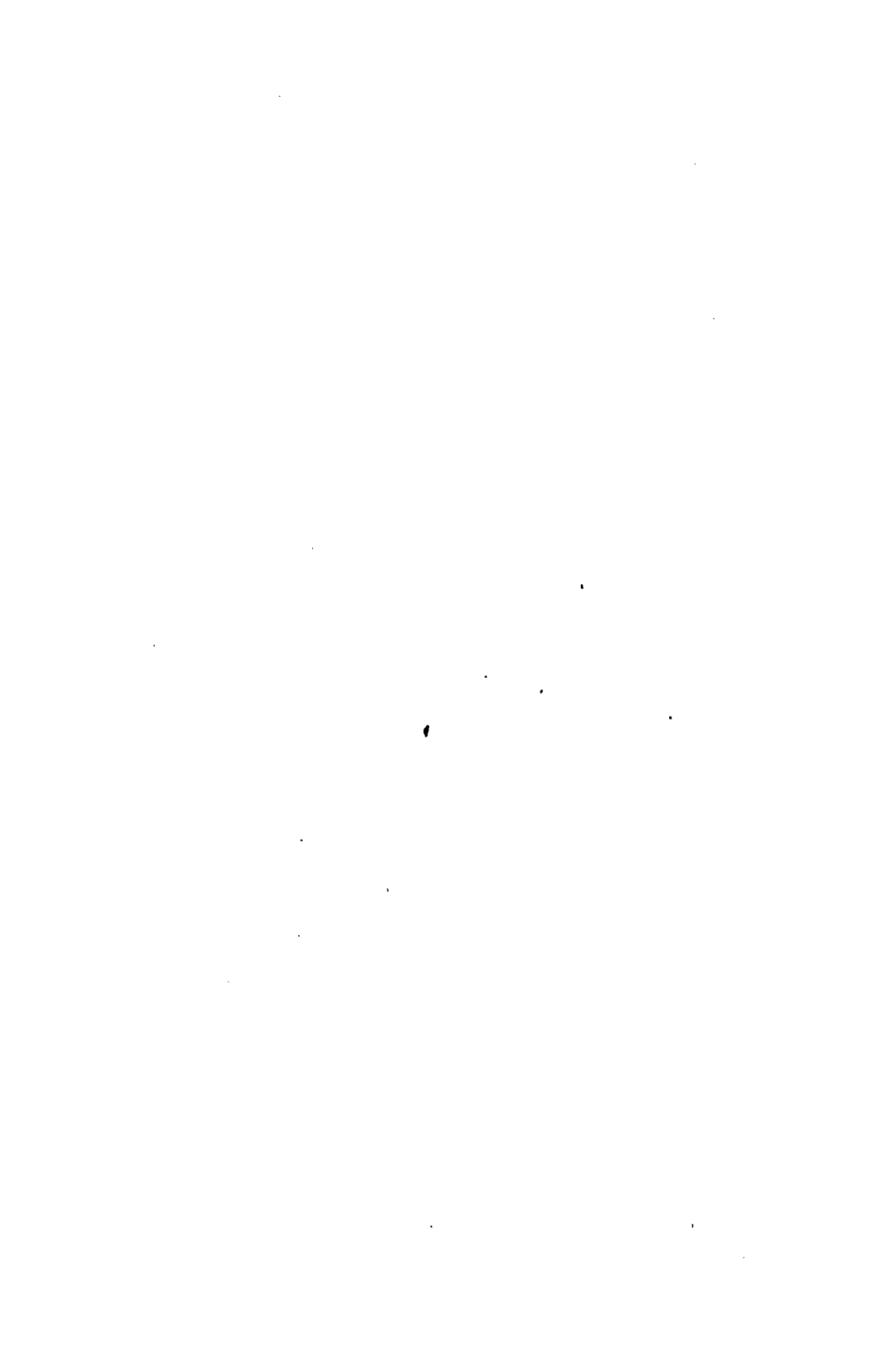
## ORDER XVI.—MONOTREMATA.

## SUB-ORDER TACHYGLOSSA.

135. *Tachyglossidae* > *Ornithorhynchidae*, Gray, C.  
P. & E. M., 393.

## SUB-ORDER PLATYPODA.

136. *Ornithorhynchi-* > *Ornithorhynchidae*, Gray, C.  
*dae* P. & E. M., 393.



**BIBLIOGRAPHY,**  
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## LIST OF AUTHORS REFERRED TO.

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The following enumeration of works is chiefly intended to explain the abbreviations used in connection with the preceding list of families: the works most accessible to students generally have been used, whenever they could be referred to in explanation of the limits of families adopted; special monographs have been chiefly referred to when the groups in connection with which they are cited have not been limited in the same manner in general works. The "Ostéographie" of de Blainville, although not actually referred to in connection with any special family, is so indispensable to any investigator of the mammals, and has been so much used by the writer, that the title thereof and an analysis of its contents have been given; the analysis and assignment of dates of publication of the several monographs will doubtless prove useful, and save to some time and labor like that necessarily devolved upon the writer in ascertaining the data furnished.

For the information of students, and because it is information often desired, the publishers' prices of most of the works cited are given, in the currency of the country where they were published. Many of the separate monographs reprinted from journals can be obtained from the second-hand book dealers—especially the German—and from the Naturalists' Agency of Salem, Mass., but at varying prices.

In order to secure uniformity of typography, only the initial letters of the characteristic words are capital, the example of the learned brothers Grimm, as well as other German writers, sanctioning such usage for their language. The initial letters, however, of the more important words of the general titles, and to which reference is made in the list, are capitalized, corresponding with and rendering at once intelligible the abbreviated references. The punctuation of the respective title-pages is adopted. The symbol (<) denotes that the memoir after which it is inserted is contained in the volume or series whose title follows; the symbol of equality (=) denotes that the memoir is co-extensive with the volume.

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**ALLEN (Joel Asaph).** On the eared seals (Otariadæ), with detailed descriptions of the North Pacific species, by J. A. Allen. Together with an account of the habits of the northern fur seal (*Callorhinus ursinus*), by Charles Bryant. < Bulletin of the Museum of Comparative Zoology, . . . II, No. 1 = pp. 1—108.

**ALLMAN (George James).** On the characters and affinities of Potamogale. . . . < Transactions of the Zoological Society of London, VI, 1—16, pl. 1-2, 1866.

**BAIRD (Spencer Fullerton).** Mammals of North America; the descriptions of species based chiefly on the collections in the museum of the Smithsonian institution. . . . With eighty-seven plates of original figures, illustrating the genera and species, and including details of external form and osteology.

Philadelphia: J. B. Lippincott & Co., 1859. [4to., 4 p. l., xi—xxxiv, 735 pp. + (Part II, 1—55 pp.) 736—764 pp., 87 pl. (29 col.)—\$10; with col. pl., \$15.]

[“Part I. General report upon the Mammals of the several Pacific railroad routes. . . . Washington, D. C., July, 1857:” reprinted from the “Reports of explorations and surveys to ascertain the most practicable and economical route for a railroad from the Mississippi river to the Pacific Ocean. . . . Volume VIII. Washington: . . . 1857.” (80 pl. in v. VI, VII, VIII.) “Part II. Special report upon the Mammals of the Mexican boundary. By Spencer F. Baird, . . . With notes by the naturalists of the survey. Washington, D. C., January, 1859:” reprinted from the “Report on the United States and Mexican boundary survey, made under direction of the secretary of the interior, by William H. Emory, major first cavalry and United States commissioner. Volume II. Washington: . . . 1859. (Part II. [§1.] Mammals of the boundary, . . .)” 62 pp. 27 pl.]

**BLAINVILLE (Henri Marie Ducrotay de).** Ostéographie ou description iconographique comparée du squelette et du système dentaire des Mammifères recents et fossiles pour servir de base à la zoologie et à la géologie | par H. M. Ducrotay de Blainville . . . . Ouvrage accompagné de 323 planches lithographiées sous sa direction par M. J. C. Werner, peintre du Museum d'histoire naturelle de Paris, précédé d'une étude sur la vie et les travaux de M. de Blainville, par M. P. Picard.—[I—IV.—See “Contents.”]—Paris: J. B. Baillière et fils . . . . 1839-1864. [Text, 4to., 4v.; Atlas, fol., 4v.]

[Published in twenty-six fascicules; the first twenty-five under the title: “Ostéographie; ou, description iconographique comparée du squelette et du système dentaire des cinq classes d'animaux vertébrés récents et fossiles, pour servir de base à la zoologie et à la géologie par M. H. M. Ducrotay de Blainville . . . . Ouvrage accompagné de planches lithographiées sous sa direction par M. J. C. Werner . . . . Paris, Arthus Bertrand, . . .” [1839-1855.] The twenty-sixth and last fascicule was issued with the *special* title above given, titles for the four volumes of text and four of plates, table of contents and index, by the Baillières in 1864. The subscription price was 2 francs 85 centimes per plate; the price of the twenty-sixth livraison, 45 francs; and of the whole, on completion, 800 francs, “au lieu de 961 fr.”

The culpable neglect of the publishers to give the dates of publication of the several fascicules has doubtless devolved upon many investigators, as upon the writer, much trouble and annoyance in ascertaining them, and to save to others similar trouble, a collation is here presented, the dates having chiefly been ascertained from Wagner's annual reports in the “Archiv für Naturgeschichte.” The appearance of successive fascicules has not been noticed in the “Bibliographie de la France.”

The titles of the respective monographs given below are those at the upper fourth of the first page of each monograph, and which are the only special titles published.

The work is more remarkable as a methodical repertory of facts respecting superficial osteological details, than as a digest exhibiting acute appreciation of the value and subordination of characters and their taxonomical application, or orthodox views respecting classification and the geological succession of

animals—the concurrent views of the most recent and approved investigators being the standard. The “genera,” it must be remembered, are generally about equal in extent to the families now generally adopted.]

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([E.] Mémoire sur la véritable place de l'Aye-Aye dans la série des Mammifères. Lu à la Société philomatique, le 16 mai 1816.) [1839.—40 pp. < F. iii.—Plate < F. iii.—Plate = pl. 5 < D.]

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 [[B.B.] Des Anoplothériums (G. Cuvier) et sur les genres plus ou moins différents:] 1849. [155 pp. 9 pl. = F. xxiii.]

Xiphodon,	} G. Cuvier, 1822.	Merycopotamus,	} Falconer et Cautley,†
Dichobune,		Hippohyus,	
Adapis,	} J. Kaup, 1833.	Paloplothorium,	} R. Owen, 1848.
Chalicotherium,		Dichodon,	
Cainotherium, Brard, 1835.		Hypopotamus,	
Microchoerus, Sc.† Wood, 1846.)			

- [[OC.] Des Ruminants (*Pecora*, L.) en général et en particulier des Chameaux, des Lamas, Buffon. (*G. Camelus*, L.) 1850. [131 pp. 5 pl. = F. xxiv.]  
 [[DD.] Ostéographie des Paresseux (*Bradypus*, L.).] [1840.—64 pp. 6 pl. = F. v.]  
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 PHILIPÈRES. Genres. Gorilla, Smilodon, Sciurus, Arctomys, Castor, Capromys, Myopotamus, Hystrix, Cavia, Equus, Camelopardalis, Myrmecophaga, Macrotherium, Megatherium, Glyptodon, Toxodon, Elasmotherium, Macrauchenia et groupes qui s'y rattachent.  
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\* The first series of letters is given in the list of monographs opposite title pages, and the second in the table of contents of the third volume.

† The cecography of the original is copied.

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[Vierte abhandlung. Blicke auf die allmälligen fortschritte in der gruppirung der Nager [Glires] mit specieller beziehung auf die geschichte der gattung Castor, besonders des altweltlichen Bibers. (pp. 77—124.) Fünfte abhandlung. Untersuchungen über die craniologischen entwickelungsstufen und die davon herzuleitenden verwandtschaften und classificationen der Nager der jetztwelt, mit besonderer beziehung auf die gattung Castor. (pp. 125—336, pl. i—xi + va.)]

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Vol. II. Containing the order Rodentia, or Gnawing mammalia; with 23 illustrations engraved on steel, and [8] engravings on wood.



# SYNOPTICAL TABLES

OF

## CHARACTERS

OF THE SUB-DIVISIONS OF

## MAMMALS,

WITH

A CATALOGUE OF THE GENERA.

---

WASHINGTON, D.C.

1871.



# MAMMALS.

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Abranchiate Vertebrates with a brain whose cerebral hemispheres are more or less connected (and in nearly inverse ratio) by an anterior commissure, and a superior transverse commissure (corpus callosum); the latter more or less roofing in the lateral ventricles: lungs and heart in the thorax, separated from the abdominal viscera by a muscular diaphragm: aorta single and reflected over the left bronchus: blood with red non-nucleated blood-corpuscles; undergoing a complete circulation, being entirely received and transmitted by the right half of the quadrilocular heart to the lungs for aeration, (and warmed,) and afterwards returned by the other half through the system. Skull with two condyles, chiefly developed on the exoccipital elements, (one on each side of the foramen magnum): with the malleus and incus superadded as specialized auditory ossicles: and the lower jaw (composed of a pair of simple rami) articulated directly by convex condyles with the squamosal bones. Dermal appendages developed as hairs. Viviparous: foetus developed from a minute egg: young nourished after birth by a fluid (milk) secreted in peculiar glands (mammary) by the mother.

## SUB-CLASSES.

- I. Brain with superior transverse commissure composed of a body as well as psalterial fibres; and with a well developed septum. Sternum with no element in front of the manubrium or presternum. Coracoid not connected with the sternum, but early anchylosed with and developed as a simple process of the scapula. Oviducts debouching into a double or single vagina, (and not into a common cloacal chamber). Testes variable in position, but the vasa deferentia open directly or indirectly into a distinct and complete urethra, (and not into a cloacal cavity). Ureters discharge directly into the bladder the renal secretion, which thence passes into the urethra. Mammary glands with well developed nipples.
- A. Brain with the cerebral hemispheres connected by a more or less well-developed corpus callosum and a reduced anterior commissure. Vagina a single tube, but sometimes with a partial septum. Young retained within the womb till of considerable size and nearly perfect development, and deriving its nourishment from the mother through the intervention of a "placenta" (developed from the allantois) till birth. Scrotum never in front of penis.

## MONODELPHIA. (I.)

- B. Brain with the cerebral hemispheres chiefly connected by a well-developed anterior commissure, the corpus callosum being rudimentary.

Vagina more or less completely dividing into two separate passages. Young born when of very small size and imperfect development; never connected by a placenta with the mother, but when born attached by her to the nipple, from which the milk is forced by herself into the mouth of the young. Scrotum in front of penis.

## **DIDELPHIA. (II.)**

- II. Brain with the superior transverse commissure with no well defined psalterial fibres; and with the septum very much reduced in size. (Flower). Sternum with a peculiar T-shaped bone (the episternum or interclavicle) in advance of the manubrium or presternum. Coracoid extending from the clavicle to the sternum, and only towards maturity ankylosed with the scapula. The oviducts, enlarged below into uterine pouches, but opening separately from one another, as in oviparous vertebrates, debouch, not into a distinct vagina, but into a cloacal chamber, common to the urinary and genital products, and to the fæces. Testes abdominal in position throughout life, and the vasa deferentia open into the cloaca, and not into a distinct urethral passage. Ureters pour the renal secretion, not into the bladder, which is connected with the upper extremity of the cloaca, but into the latter cavity itself. Mammary glands with no distinct nipples. (Huxley.)

## **ORNITHODELPHIA. (III.)**

### **I. MONODELPHIA**

#### **ORDERS.**

- I. Brain with a relatively large cerebrum, behind overlapping much or all of the cerebellum, and in front much or all of the olfactory lobes: corpus callosum (atypically) continued horizontally backwards to or beyond the vertical of the hippocampal sulcus, developing in front a well-defined recurved rostrum.

#### **SUPER-ORDER EDUCABILIA.**

- A. Posterior members and pelvis well developed. Periotic and tympanic bones articulated with the squamosal; (etypically, free and otherwise modified, *e. g. Tapiridae*).

1. Legs almost or entirely exerted outside of the common abdominal integument. First digit (great toe) of hind foot (pes) enlarged, opposable to the others, (exceptionally resuming parallelism with them,) furnished with a nail. Brain with a well-developed calcarine sulcus, giving rise to a hippocampus minor within the posterior cornu of the ventricle by which the posterior lobe of the cerebrum is traversed. (Flower.) (Incisors four in each jaw; etypically, two—or all in upper jaw—suppressed. Clavicles completely developed.)



- a. Digits with corneous appendages developed as claws (i. e. compressed) or, atypically, as nails (i. e. depressed). Teeth of three kinds, (canines of second set etypically atrophied,) all encased in enamel; (molars mostly two- or three-rooted). Placenta deciduate, discoidal.

## PRIMATES. (I.)

2. Legs with the proximal joints (humerus and femur) more or less inclosed in the common abdominal integument. First digit of hind foot atypically reduced or atrophied; etypically hypertrophied (e. g. *Pinnipedia*). Brain with no calcarine sulcus. (Incisors archetypically six in each jaw; etypically, two or more suppressed. Clavicles rudimentary, or—in (b) Ungulate Series—none.)

- a. Digits with corneous appendages developed as claws. Teeth of three kinds, all encased with enamel: canines specialized and robust: (molars mostly two- or three-rooted—etypically one-rooted,—atypically one ( $\frac{p.m.4}{m.1}$ ) or more in each jaw sectorial, followed by tubercular ones.) Scaphoid and lunar consolidated into one bone. Placenta deciduate, zonary.

## FERAE. (II.)

- b. Digits with corneous appendages developed as hoofs. Teeth of three kinds, (canines and incisors of second set exceptionally in part undeveloped,) all encased in enamel: (molars atypically two- or three-rooted, atypically with grinding surfaces.) Scaphoid and lunar separate. Placenta diversiform.

- b. 1. Incisors (archetypically  $\frac{1}{2}$ ; often, especially in the upper jaw, reduced in number or wholly suppressed; implanted by simple roots,) with incisorial crowns. Feet with inferior (or, rather, posterior) surfaces with a hairy skin continuous with the rest of the integument: carpal bones in two interlocking rows; cuneiform narrow and affording a diminished surface of attachment forwards for the ulna (which is retrorse beside the radius); unciform and lunar articulating with each other and interposed between the cuneiform and magnum: hind foot with the astragalus at its anterior portion scarcely deflected inwards, articulating more or less with the cuboid as well as navicular: toes (not more than four completely developed) with terminal joints encased in thick hoofs. Placenta non-deciduate, (diffuse or cotyledonary).

## UNGULATA. (III.)

- b. 2. Incisors ( $\frac{1}{2}$  or  $\frac{3}{4}$ ; variable as to insertion,) with incisorial crowns. Feet mostly unknown: carpal bones unknown: hind foot with the astragalus at its anterior portion inclined obliquely inwards, articulating in front only with the navicular. Calcaneum with an extensive upwards surface for the articulation of the fibula, and with a large lateral process articulating in front with

the astragalus. Molars of upper jaw broad and extending into an externo-anterior angle; of lower jaw, narrow and continuous in a uniform row.

### **TOXODONTIA. (IV.)**

- b. 3. Incisors ( $\frac{1}{1}$ ) of upper jaw next to symphysis (with persistent pulps) long and curved; those of lower jaw straight and normal. Feet with inferior surfaces furnished with pads, (as in Rodents and Carnivores): carpal bones in two interlocking rows; cuneiform extending inwards, (and articulating with magnum,) and affording an enlarged surface of attachment forwards for the ulna (which is antroersely produced); unciform and lunar separated by the interposition of the cuneiform and magnum: hind foot with the astragalus at its anterior portion extended and, as a whole, much deflected inwards, articulating in front only with the navicular: toes (four to the front feet, three to the hind) with terminal phalanges encased in hoofs; (inner nail of hind foot curved). Placenta deciduate, zonary.

### **HYRACOIDEA. (V.)**

- b. 4. Incisors ( $\frac{3}{3}$ , or, in extinct forms,  $\frac{3}{2}$  or  $\frac{2}{2}$ , renewed from persistent pulps,) developed as long tusks curved outwards. Feet with palmar and plantar surfaces invested in extended pad-like integuments, which also underlie the toes: carpal bones in two regular (not interlocking) rows, broad and short; cuneiform extended inwards—broad, and furnishing an enlarged surface of attachment forwards for the ulna (which is antroersely produced). Unciform directly in front of cuneiform, and magnum directly in front of lunar: hind foot with the astragalus at its anterior portion very short, (convex,) and not deflected inwards, articulating in front only with the navicular: toes (five to each foot, in known forms,) encased in broad shallow hoofs. Placenta deciduate, zonary.—Snout produced into a very long proboscis. Legs mostly exerted outside the abdominal integument; and with the proximal and succeeding joints extensible in the same line.

### **PROBOSCIDEA. (VI.)**

B. Posterior members and pelvis more or less completely atrophied; the form of the body being fish-like, furnished with a horizontal tail, and specialized for progression in the water. Periotic and tympanic bones ankylosed together, but not articulated with the squamosal.

1. Brain narrow. Skull with the foramen magnum posterior, directed somewhat downwards: supra-occipital nearly vertical and not extending forwards, the parietals meeting and interposed between it and the frontals. Periotic with a posterior irregularly rounded part; tympanic annuliform. Lower jaw with well-developed ascending rami and normal transverse condyles and coronoid processes. Lateral teeth molar, and adapted to trituration of herbage. Neck moderate; second

cervical vertebra with an odontoid process. Anterior members moderately long, flexed at the elbow; with carpal bones and phalanges directly articulated with the adjoining ones; and with normal digits. Mamme two, pectoral.—Heart deeply fissured between the ventricles.

## **SIRENIA. (VII.)**

2. Brain broad. Skull with the foramen magnum entirely posterior, directed somewhat upwards: supra-occipital very large, sloping forwards, and (atypically) extending forwards over or between the frontals. Pariotic attenuated backwards; tympanic solid, entire. Lower jaw with no ascending ramus, with its narrow condyles at the posterior extremities or angles of the rami, and with only rudimentary coronoid processes. Teeth conic or compressed, monophyodont. Neck atypically very short; second cervical vertebrae with no odontoid process. Anterior members (atypically) abbreviated, extended backwards in a continuous line; with carpal bones and phalanges often separated by cartilage; and with the second digit composed of more than three phalanges. Mamme two, inguinal.

## **CETE. (VIII.)**

- II. Brain with a relatively small cerebrum, leaving behind much of the cerebellum exposed, and in front much of the olfactory lobes: corpus callosum extending more or less obliquely upwards and terminating before the vertical of the hippocampal sulcus; with no well defined rostrum in front.

## **SUPER-ORDER INEDUCABILIA.**

- A. Teeth encased in enamel: incisors (very variable as to number) without persistent pulps: canines present (but sometimes modified in form): molars atypically with sharp and pointed cusps. Lower jaw with condyles transverse, received into special glenoid sockets. Placenta discoidal deciduate.

1. Anterior members adapted for flight: the ulna and radius being united, and the metacarpal bones and phalanges—2 to 5—much elongated; the whole sustaining a very thin leathery skin arising from the sides of the body, and extending backwards on the hind members, down to their tarsi. Mamme pectoral.

## **CHIROPTERA. (IX.)**

2. Anterior as well as posterior members adapted for walking or grasping: the ulna and radius entirely or partly separated: metacarpal bones and phalanges normally developed. Mamme abdominal: (etypically—in Dermoptera, &c.—pectoral).

## **INSECTIVORA. (X.)**

July, 1871.

B. Teeth encased in enamel: incisors ( $\frac{2}{2}$ ; exceptionally, also two supplementary posterior teeth,) continually reproduced from persistent pulps, and growing in a circular direction: canines none: molars atypically with ridged surfaces. Lower jaw with condyles longitudinal, and not received in special glenoid sockets, but gliding freely backwards and forwards in longitudinal furrows. Members and feet ambulatorial. Placenta discoidal deciduate.

## GLIRES. (XI.)

C. Teeth (when developed) not encased in enamel: incisors typically absent (lateral present in *Dasypus*): molars variable: members and feet ambulatorial, (modified often for grasping and digging). Placenta diversiform (discoidal deciduate in *Orycteropodidae* and *Dasypodidae*; diffuse deciduate in *Manididae*; and coyledonous non-deciduate? in *Bradypodidae*).

## BRUTA. (XII.)

# I. PRIMATES.

## SUB-ORDERS.

I. Cerebrum with its posterior lobe much developed, wholly or mostly covering the cerebellum. Skull with lachrymal foramen within the orbit. Orbit separated from temporal fossa by the union of the alisphenoid and malar bones. Ears rounded, each with a distinct lobule. Female with uterus undivided, and clitoris imperforate. Mammas (2) exclusively pectoral.

## ANTHROPOIDEA.

II. Cerebrum with the posterior lobe not extended backwards over the entire cerebellum, a considerable portion of the latter being uncovered. Skull with lachrymal foramen outside the orbit. Orbits open behind, (partially closed in *Tarsiidae*). Ears more or less produced upwards and pointed, angulated at their extremities, with no distinct lobules. Female with uterus two-horned, and the clitoris perforated by the urethra. Mammas variable.

## PROSIMIAE.

## ANTHROPOIDEA.

### FAMILIES.

I. Fore limbs withdrawn completely from the locomotive series, and transferred to the cephalic (Dana). Form habitually erect, except in infancy. Feet with the great toe produced, and in same plane with others. Teeth in an uninterrupted series. Hair scant. (*Bimana*.)

## HOMINIDAE. (I.)

II. Fore limbs more or less employed in progression. Form prone, exceptionally erect. Feet with the great toe more or less abbreviated, thumb-like,

and opposable to the others. Dental series interrupted by diastemas, especially in the upper jaw between canines and incisors. Hair dense. (*Simia*.)

A. A bony external auditory meatus well developed, at the bottom of which is the membrana tympani. Pre-molars  $\frac{3}{2} \times 2$ . (Teeth M  $\frac{3}{2}$  PM  $\frac{3}{2}$  C  $\frac{1}{2}$  I  $\frac{3}{2} \times 2$ .) Nose with the median septum thin and narrow (exceptionally, broad), and the nostrils correspondingly approximated. (*Simia catarrhina*.)

1. Spinal column with a slight sigmoid curve; lumbar as well as dorsal neural spines directed more or less backwards. Sacrum large and solid, composed of four vertebræ tapering gradually backwards. Sternum broad and short, with three or four bones between the manubrium and xiphoid cartilage. Anterior limbs much longer than posterior.

**SIMIIDAE. (II.)**

2. Spinal column with a simple curve; neural spines of lumbar and last dorsal vertebræ inclined forwards. Sacrum moderate, composed generally of three vertebræ not tapering gradually. Sternum elongated and narrow. Anterior limbs shorter than posterior; rarely elongated.

**CYNOPITHECIDAE. (III.)**

B. Bony external auditory meatus null, and the tympanic membrane attached to a ring close to the surface. Pre-molars  $\frac{3}{2} \times 2$ . Nose with the septum broad and flattened (exceptionally, narrow), and the nostrils proportionally distant. (*Simia platyrhina*.)

1. Teeth (M  $\frac{3}{2}$  PM  $\frac{3}{2}$  C  $\frac{1}{2}$  I  $\frac{3}{2} \times 2 =$ ) 35. Manus with inner digit (when developed) more or less slightly opposable to the rest.

**CEBIDAE. (IV.)**

2. Teeth (M  $\frac{3}{2}$  PM  $\frac{3}{2}$  C  $\frac{1}{2}$  I  $\frac{3}{2} \times 2 =$ ) 32. Manus with inner digit not opposable, but on same plane as rest; all armed with elongated compressed claws.

**MYIDAE. (V.)**

## **I. HOMINIDAE.**

*Single genus.*

*Homo.*

## **II. SIMIIDAE.**

### **SUB-FAMILIES.**

- I. Form robust. Ilii broad, alate. Cerebrum projecting backwards over the cerebellum. Buttocks without callosities.

**SIMIINAE. (A.)**

- II. Form slender. Ilii narrow, not alate. Cerebrum scarcely or not projecting backwards over the cerebellum. Buttocks with callosities.

**MYLOBATINAE. (B.)**

## A. SIMIINAE.

*Gorilla* I. Geoff.*Mimetes* Leach = *Troglodytes*, Geoff. = *Anthropopithecus*, Bl.*Simia* Linn. = *Pithecus* Geoff.

## B. HYLOBATINAE.

*Siamanga* Gray.*Hylobates* Ill.*Extinct Simiidae?**Pliopithecus* Gerv.*Dryopithecus* Lartet.

## III. CYNOPITHECIDAE.

## SUB-FAMILIES.

I. Stomach complex; the cardiac portion dilated; the pyloric elongated.

Cheek pouches obsolete.

SEMNOPITHECINAE. (A.)

II. Stomach simple, as in man. Cheek pouches developed.

CYNOPITHECINAE. (B.)

## A. SEMNOPITHECINAE.

*Nasalis* Geoff.*Lasiopyga* Ill., Gray.*Semnopithecus* F. Cuv.*Colobus* Ill.*Guereza* Gray.

## B. CYNOPITHECINAE.

## §. 1.

*Miopithecus* I. Geoff.*Cercopithecus* Erxl.*Cercopithecus* sensu strict.*Chlorocebus* Gray.

## §. 2.

*Cercocebus* Geoff.*Macacus* Lac., Desm.*Macacus* sensu strict.*Silenus* Gray.*Inuus* Geoff.*Theropithecus* I. Geoff. = *Gelada* Gray.*Cynopithecus* I. Geoff.

## §. 3.

*Papio* Erxl., Cuv., Geoff. = *Cynocephalus* Lac.*Cynocephalus*, sensu strict.*Hamadryas* Less., Gray.*Mandrilla* Cuv., = *Mormon* Less.*Mormon*, Gray, not Ill.*Choeropithecus* Gray.*Extinct Cynopithecidae.**Mesopithecus* Gaudry.*Coenopithecus* Rutimeyer.

## IV. CEBIDÆ.

## SUB-FAMILIÆ.

- I. Cerebrum with posterior lobe abbreviated, scarcely covering the cerebellum behind. Hyoid bone and thyroid cartilage greatly developed: hyoid bone expanded into a sub-globular drum, with thin osseous walls, the larger cornua projecting backwards, the lesser obsolete. Incisors vertical.

MYCETINÆ. (A.)

- II. Cerebrum with posterior lobe enlarged, extending backwards much beyond the cerebellum. Hyoid bone and thyroid cartilage moderate.

## A. Incisors vertical.

1. Cerebrum with convolutions well marked. Tail more or less prehensile.

CEBINÆ. (B.)

2. Cerebrum with convolutions obsolete. Tail not prehensile.

NYCTIPITHECINÆ. (C.)

## B. Incisors inclined forwards. Tail more or less abbreviated and bushy.

PITHECINÆ. (D.)

## A. MYCETINÆ.

*Alouatta* Lac.=*Mycetes* Ill.

## B. CEBINÆ.

§. 1.

*Cebus* Erxl.

§. 2.

*Sapajou* Lac.=*Ateles* Geoff.*Eriodes* I. Geoff.=*Brachyteles* Gray.*Lagothrix* Geoff.

## C. NYCTIPITHECINÆ.

§. 1.

*Nyctipithecus* Spix=*Aotus* (Humb) Ill. (Inapplicable.)

§. 2.

*Callithrix* Geoff.*Saimiris* Geoff., Gerv.=*Chrysothrix* Wagn

## D. PITHECINÆ.

*Pithecia* Desm.*Chiropotes* Ill., Gray.*Brachyurus* Spix=*Ouakaria* Gray.*Extinct Cebidæ.**Protopithecus* Lund.

## V. MIIIDAE.

## GENERA.

*Saguinus* Lac.—*Hapale* Geoff.*Hapale* Gray.*Cebuella* Gray.*Midas* Geoff.*Leontopithecus* Gray.*Midas* Gray.*Jacchus* Gray.*Mico* Gray.*Oedipus* Gray.*Seniocebus* Gray.

## PROSIMIAE.

## FAMILIES.

I. Teeth of three kinds, the canines being retained through life. Incisors small, with simple roots. Pectoral mammae developed, in addition to inguinal ones. (Owen.) (*Lemuroidea*.)

A. Fibula entirely distinct from the tibia. Skull with the orbits open behind. Incisors of upper jaw small, (rarely wanting,) separated into two groups by a symphysial interspace; of lower jaw, larger, contiguous, and proclivous; canines of lower jaw parallel with and like incisors. Pes with the second toe armed with a subulate claw; rest with flattened nails.

## LEMURIDAE. (VI.)

B. Fibula partially ankylosed with the tibia. Skull with the orbits partially closed behind by the union above of the alisphenoid with the jugal. Incisors of upper jaw (4) contiguous, inner large and conic; of lower (2) contiguous and opposed to large upper teeth: canines of lower jaw normal. Pes with the second and third toes armed with subulate nails; rest with flattened pointed nails.

## TARSIIDAE. (VII.)

II. Teeth of two kinds, the canines being early deciduous. Incisors  $\frac{3}{4}$ , gli-riform, continually reinforced from the formative pulp; the fangs very long, those of the lower jaw extending backwards to the base of the coronoid processes. Inguinal teats only developed.—Manus with the middle finger very attenuated, and provided with a narrow scooped nail; rest of nails (except of thumb of pes) similar, subulate. (*Daubentonioidea*.)

## DAUBENTONIIDAE. (VIII.)

## SUPER-FAMILY LEMUROIDEA.

## VI. LEMURIDAE.

## SUB-FAMILIES.

I. Teeth 30; i. e. M.  $\frac{3}{4}$  P.M.  $\frac{3}{4}$  C.  $\frac{1}{1}$  I.  $\frac{2}{1}$  X2.

## INDETERMINAE. (A.)

II. Teeth 36 (exceptionally 32); i. e. M.  $\frac{3}{4}$  P.M.  $\frac{3}{4}$  C.  $\frac{1}{1}$  I.  $\frac{2}{1}$  X2 (exceptionally, I.  $\frac{2}{1}$  in adult).

A. Tarsus short or of moderate length.



1. Hind limbs considerably longer than the fore. Neural spines of last dorsal and lumbar vertebræ inclined forwards. Ears (in typical forms) moderate, with the anterior portion of the helix well developed, folded over the fossæ of the concha and antihelix, and with the tragus and antitragus distinct. Tail elongated, not less than two-thirds the length of body.

LEMURINÆ. (B.)

2. Hind and fore limbs sub-equal, or fore ones shorter. Neural spines of dorsal and lumbar vertebræ inclined backwards. Ear (in typical forms) small, with the helix little marked, and tragus and antitragus obsolete. Tail short (always shorter than half the length of the body), rudimentary, or absent. (Mivart.)

NYCTOMBINÆ. (C.)

- B. Tarsus very long; calcaneum more than one-third the length of the tibia; naviculare much longer than the cuboid (Mivart).—Hind limbs much longer than the fore. Neural spines of the twelfth or thirteenth dorsal vertebræ turned forwards. Ear very large, with the pinna prolonged upwards.

GALAGININÆ. (D.)

#### A. INDRISINÆ.

*Indris* Cuv. Geoff. = *Lichanotus* Ill. = *Pithelemur* Less.

*Propithecus* Benn. = *Macromerus* Smith.

*Microhynchus* Jourd. = *Avahis* Geoff.

#### B. LEMURINÆ.

*Lemur* Linn.

*Varecia* Gray.

*Prosimia* Gray.

*Lemur* Gray.

*Hapalemur* I. Geoff.

*Hapalemur* Gray.

*Prolemur* Gray.

*Lepilemur* I. Geoff.

*Chirogaleus* Geoff. (St. G. Mivart.) = *Myspithecus* F. Cuv.

#### C. NYCTOMBINÆ.

##### §. 1.

*Perodicticus* Benn.

*Arctocebus* Gray, Huxl.

##### §. 2.

*Nycticebus* Geoff. = *Stenops* Ill. = *Bradylemur* (Blainv.) Less.

*Loris* Geoff. = *Arachnocebus* Less.

#### D. GALAGININÆ.

*Galago* Geoff. = *Otolicnus* Ill.

*Otolemur* Coq. = *Callotus* Gray.

*Otogale* Gray.

*Galago* sensu strict.

*Hemigalago* Dahlb.

*Microcebus* Geoff.

*Murilemur* Gray.

*Phaner* Gray.

*Azema* Gray.

*Mirza* Gray.

## VII. TARSIIDAE.

*Tarsius* Storr.=*Macrotarsus* C. & G.=*Cephalopachus* Sw.=*Hypsicebus* Less.

## SUPER-FAMILY DAUBENTONIOIDEA.

## VIII. DAUBENTONIIDAE.

*Daubentonia* Geoff.=*Aye-aye* Lac.=*Cheiromys* Cuv.

## FERAE.

## SUB-ORDERS.

- I. Body more or less raised, with the legs exerted beyond the elbows and knees, and with the feet (generally with free toes) adapted for walking. Manus and pes with first phalanges and digits not enlarged nor produced beyond the others (atypically more or less reduced or even atrophied). Skull moderately compressed between the orbits: with a distinct lachrymal bone, perforated by a canal (the lachrymal), and more or less exerted outside the orbit, and, in conjunction with the malar, forming the anterior margin of the orbit: palatines extending forwards laterally between the frontal and maxillary bones, and leaving no vacuity. Tympanic bounded behind by the exoccipital. Deciduous dentition well developed.

## FISSIPEDIA.

- II. Body prone, with the legs confined in the common integument beyond the elbows and knees, (with the feet rotated backwards, and with toes connected together), and especially adapted for swimming. Manus and pes with first phalanges and digits enlarged and produced beyond the others. Skull much compressed between the orbits: with a lachrymal bone early united with the maxillary, imperforate, and entirely contained within the orbit: malar applied to the inner side of a transverse zygomatic process of the maxillary and not continued to the front of the orbit (which is therefore bounded by the maxillary): palatines not extending forwards laterally, extensive vacuities intervening between the frontal and maxillary bones. Tympanic separated from the exoccipitals by a vacuity as well as by the re-entering periotic bones. Deciduous dentition much reduced and rudimentary.

## PINNIPEDIA.

## FISSIPEDIA.

## FAMILIES.

- I. Skull with the paroccipital process applied closely to the auditory bulla; the mastoid process small or obsolete; external auditory meatus very short or imperfect. Intestinal canal provided with a cœcum. Prostate gland salient.
- A. Skull with carotid canal minute and superficial or obsolete; condyloid foramen and foramen lacerum posticum debouching in a common fossa: glenoid foramen minute or null. Os penis rudimentary (in *Cryptoproctidæ*, enlarged). Cowper's glands present. (*Aeluroidæ*.)

1. Teeth 28-30 ( $M \frac{1}{1}$ ,  $PM \frac{1}{2}$  or  $\frac{3}{2}$ ,  $C \frac{1}{1}$ ,  $I \frac{3}{3} \times 2$ ): true molar of upper jaw small, tubercular; of lower, sectorial. Snout very short, decurved. Bulla divided by a septum into posterior and anterior chambers communicating with each other by a narrow aperture. (*Aeluroidea typica*.)

- a. Body compact. Feet digitigrade, with the palms and soles hairy. Skull with no alisphenoid canal.

**FELIDAE (IX)**

- b. Body elongated, viverriform. Feet plantigrade, with the palms and soles bald. Skull with a distinct alisphenoid canal.

**CRYPTOPROCTIDAE (X)**

2. Teeth 32-34, diversiform, but no tubercular (or second true) molar in lower jaw. Snout moderate, depressed. Bulla with no septum. Feet digitigrade. (*Aeluroidea hyæniformia*.)

- a. Teeth 32 ( $M \frac{1}{1}$ ?  $PM \frac{2-4}{1}$ ?  $C \frac{1}{1}$ ,  $I \frac{3}{3} \times 2$ ); molars very small and distant; no functionalized sectorial molars.

**PROTELIDAE (XI)**

- b. Teeth 34 ( $M \frac{1}{1}$ ,  $PM \frac{1}{1}$ ,  $C \frac{1}{1}$ ,  $I \frac{3}{3} \times 2$ ); molars large and approximated; true molar of upper jaw reduced, tubercular; last pre-molar sectorial, feline: true molar of lower jaw sectorial.

**HYÆNIDAE (XII)**

3. Teeth 36-40 ( $M \frac{3}{3}$ —rarely  $\frac{1}{1}$ — $PM \frac{1}{1}$ —exceptionally  $\frac{3}{3}$ — $C \frac{1}{1}$ ,  $I \frac{3}{3} \times 2$ ); true molars of the upper, and last of the lower jaw tubercular. Snout moderate or elongated, depressed. Auditory bulla divided. (*Aeluroidea viverriformia*.)

- a. Skull irregularly flattened behind above foramen magnum; with the snout moderate or robust. Incisors approximated; canines robust.

**VIVERRIDAE (XIII)**

- b. Skull convex behind above foramen magnum (at least, especially so in young); with the snout slender. Incisors not approximated; canines small.

**EUPLERIDAE (XIV)**

- B. Skull with the carotid canal well developed, but opening into the foramen lacerum posticum; condyloid foramen distinct; glenoid foramen patent. Os penis large. Cowper's glands not developed. (*Cynoidea*.)

1. Teeth typically 42; varying between 38 and 46 (the true molars being the varying element.— $M \frac{3}{3}$  ( $\frac{1}{1}$ — $\frac{3}{3}$ ),  $PM \frac{1}{1}$ ,  $C \frac{1}{1}$ ,  $I \frac{3}{3} \times 2$ ).

**CANIDAE (XV)**

- II. Skull with the paroccipital process not closely applied to the auditory bulla; the mastoid process prominent and projecting outwards or downwards behind the external auditory meatus; external auditory meatus diversiform. Intestinal canal with no cœcum. Prostate gland not salient, being contained in the thickened walls of the urethra.—Skull with the

carotid canal distinct, and more or less in advance of the foramen lacerum posticum; condyloid foramen also distinct from the foramen lacerum posticum; glenoid foramen generally well defined. Os penis very large. Cowper's glands not developed.—(*Arctoidea*.)

- A. True molars of upper jaw one ( $M \frac{1}{2}$ ; rarely—in *Mellivorina*— $\frac{1}{3}$ ); last pre-molar of upper jaw sectorial (rarely—in *Enhydrina*—with blunt tubercles). (*Arctoidea musteliformia*.)

#### MUSTELIDAE. (XVI.)

- B. True molars of upper jaw two; last pre-molar of upper jaw tubercular (rarely—in *Bassaridina*—sectorial).

1. Last molar of upper jaw oblong and exceeding the first: three true molars in lower jaw; first narrowest but longest; second oblong and broader. Foramen lacerum posticum introrse, behind the postero-internal angle of the tympanic bone; carotid canal little in advance of the foramen lacerum posticum. Tail rudimentary. (*Arctoidea typica*.)

#### URSIDAE. (XVII.)

2. Last molar of upper jaw more or less transverse and compressed forwards; two true molars in lower jaw; first broadest. Foramen lacerum posticum antorse from postero-internal angle of the tympanic bone; carotid canal nearly at or in advance of middle of inner wall of the auditory bulla. Tail well developed. (*Arctoidea procyoniformia*.)

- a. Alisphenoid canal developed: auditory bulla very small, and with a very prolonged bony floor to the auditory meatus: paroccipital process long and trigonal, standing backwards and outwards, quite unconnected with the bulla. (Flower.)—Teeth 36 ( $M \frac{1}{2}$ ,  $PM \frac{1}{3}$ ,  $C \frac{1}{4}$ ,  $I \frac{1}{2} \times 2$ ).

#### AELURIDAE. (XVIII.)

- b. Alisphenoid canal none: auditory bulla well developed, and with a short bony floor to the auditory meatus: paroccipital process short and blunt, somewhat hooked, generally contiguous to the bulla at the base.

- b. 1. Teeth 36 ( $M \frac{1}{2}$ ,  $PM \frac{1}{3}$ ,  $C \frac{1}{4}$ ,  $I \frac{1}{2} \times 2$ ); last pre-molar of upper jaw and first molar of lower tubercular. Snout abbreviated, decurved. Lower jaw very stout, with an extensive ankylosed symphysis, with high coronoid processes, and extended backwards and downwards at the angles.

#### CERCOLEPTIDAE. (XIX.)

- b. 2. Teeth 40 ( $M \frac{1}{2}$ ,  $PM \frac{1}{4}$ ,  $C \frac{1}{4}$ ,  $I \frac{1}{2} \times 2$ ); last pre-molar of upper jaw and first molar of lower tubercular. Lower jaw moderate or slender, with a reduced symphysis, with recurved coronoid processes, and extended upwards to the angles, which are near the condyles.

#### PROCTONIDAE. (XX.)

- b. 3. Teeth 40 ( $M \frac{3}{2}$ ,  $PM \frac{1}{2}$ ,  $C \frac{1}{2}$ ,  $I \frac{3}{2} \times 2$ ), resembling those of *Canidæ*; first upper pre-molars sometimes deciduous; last pre-molar of upper jaw and first molar of lower sectorial. Lower jaw as in *Procyonidæ*.

**BASSARIDIDÆ (XXI.)***Familiz incertæ sedis.*

1. Teeth 32? ( $M \frac{3}{2}$ ?  $PM \frac{3}{2}$ ?  $C \frac{1}{2}$ ?  $I \frac{3}{2}$ ?  $\times 2$ )? last pre-molar of lower jaw moderate; first molar obtusely sectorial; second oblong, tuberculated.

**SIMOCYONIDÆ (XXII.)**

2. Teeth 44 ( $M \frac{3}{2}$ ,  $PM \frac{1}{2}$ ,  $C \frac{1}{2}$ ,  $I \frac{3}{2} \times 2$ )? last pre-molar of upper jaw tri-tuberculate; true molars tuberculate.

**ARCTOCYONIDÆ (XXIII.)**

3. Teeth 44? ( $M \frac{3}{2}$ ,  $PM \frac{1}{2}$ ,  $C \frac{1}{2}$ ,  $I \frac{3}{2} \times 2$ )? last pre-molar of lower jaw enlarged; first as well as second and third molars sectorial.

**HYÆNODONTIDÆ (XXIV.)****SUPER-FAMILY AELUROIDEA.****IX. FELIDÆ.****SUB-FAMILIES.**

- I. Canine teeth of upper jaw moderate, with transversely convex anterior and posterior margins; those of lower jaw equal to upper and much exceeding adjoining incisors.

- A. Sectorial tooth of upper jaw with an inwardly projecting antero-internal lobe. Claws retractile.

**FELINÆ (A.)**

- B. Sectorial tooth of upper jaw with no internal lobe. Claws not retractile.

**GUERARDINÆ (B.)**

- II. Canine teeth of upper jaw enormously developed, compressed, and with distal trenchant anterior and posterior margins; those of lower jaw reduced in inverse ratio, and not much larger than the adjoining incisors. (Sectorial tooth of upper jaw with a transverse inner lobe some distance in front of the anterior end of the tooth.)

**MACHÆRODONTINÆ (C.)****A. FELINÆ.**

*Lynx* Raf.  
*Lynx* Gray.  
*Neofelis* Gray.  
*Viverriceps* Gray.  
*Felis* Linn.  
*Uncia* Gray.  
*Tigris* Gray.  
*Pardalina* Gray.

*Caracal* Gray.  
  
*Leo* Gray.  
*Leopardus* Gray.  
*Catolynx* Gray.

*Pajeros* Gray.  
*Chaus* Gray.  
*Aelurina* Gerv. = *Ailurogale* Fitz.

*Felis* Gray.

## B. GUEPARDINAE.

*Gueparda* Gray.

## C. MACHAERODONTINAE.

*All extinct.*

*Drepanodon* Nesti, Bronn.  
*Machærodus* Kaup, Bronn.  
*Smilodon* Lund, Bronn.

## Other Felidae of Extinct Genera.

*Pseudalurus* Gerv.  
*Trucifelis* Leidy.  
 ? *Dinictis* Leidy.  
 ? *Aelurodon* Leidy.

## X. CRYPTOPROCTIDAE.

*Single Genus.*

*Cryptoprocta* Bennett.

## XI. PROTELIDAE.

*Single Genus.*

*Proteles* I. Geoff.

## XII. HYAENIDAE.

*Genera.*

*Hyaena* Linn.  
*Crocuta* Gray.

## XIII. VIVERRIDAE.

### SUB-FAMILIES.

I. Auditory bulla divided by an oblique groove into two portions; an anterior with the auditory meatus, and a posterior more inflated and larger portion. (Flower.) Toes short, regularly arched; the last phalanges bent up, withdrawing the claws into a sheath; claws sharp. (Gray, s. *Aeluropodae*.)

A. Nose simple, flat, bald, and with a central groove beneath.—Gray, s. *Viverrida*.

1. Digitigrade: the under-side of the hind feet hairy, except the pads, metatarsus, and sometimes a small part of the tarsus. Upper flesh-tooth elongate; upper tubercular grinders small, transverse.—Gray.

a. Body robust; tubercular grinders two above, one below on each side (3-4).—Gray.

VIVERRINAE. (A.)

- b. Body slender, elongate; tubercular grinders one on each side above and below ( $\frac{1}{1}-\frac{1}{1}$ ).—Gray.

**PRIONODONTINAE (B.)**

2. Subplantigrade: the under-side of the toes and more or less of the back of the tarsus naked, callous. Flesh-tooth strong; upper tubercular grinders large, broad.

- a. Tail moderate, not prehensile. The hinder part of the tarsus hairy to the palm; the tail bushy.

**GALIDINAE (C.)**

- b. Tail moderate, not prehensile. The upper part of the hinder part of the tarsus hairy to the palm; tail ringed. (Gray.) Sectorial tooth with large tubercular ledge.

**HEMIGALIDINAE (D.)**

- c. Tail very long, sub-convolute. The hinder part of the tarsus bald, callous. (Gray.) Sectorial tooth typical.

**PARADOXURINAE (E.)**

- d. Tail thick, strong, prehensile. The hinder part of the tarsus bald, callous. Sectorial tooth of upper jaw transverse, sub-tubercular.

**ARCTIOTIDINAE (F.)**

- B. Nose rather produced, rounded, hairy, and without any central groove below (Gray, s. *Cynogalidae*). Sectorial tooth with an extensive tubercular ledge.

**CYNOGALINAE (G.)**

- II. Auditory bulla very prominent and somewhat pyriform, divided by a transverse constriction into two portions; the anterior nearly as large and inflated as the posterior. (Flower.) Toes straight; the last phalanx and claws extended. The claws blunt and worn at the end, the front ones often elongated. (Gray, s. *Cynopoda*.)

- A. Nose flat and bald, beneath with a central groove. (Gray, s. *Herpestidae*.)

1. Head elongate, conical; tail conical or cylindrical. (Gray.)

**HERPESTINAE (H.)**

2. Head short, ventricose; tail bushy, expanded laterally; claws elongate. (Gray.)

**CYNICTIDINAE (I.)**

- B. Nose broad, convex, and hairy, beneath without any central groove. (Gray, s. *Rhinogalidae*.)

1. Head elongate, nose short. Teeth 40. False grinders  $\frac{3}{1}$ . (Gray.)

**RHINO GALINAE (J.)**

2. Head ventricose. Nose elongate. Teeth 36. False grinders  $\frac{3}{1}$ . (Gray.)

**CROSSARCHINAE (K.)**

## A. VIVERRINAE.

## §. 1.

*Viverra* Linn.*Viverricula* Hodgson.

## §. 2.

*Genetta* Cuv.*Genetta* Gray.? *Fossa* Gray.

## B. PRIONODONTINAE.

*Prionodon* Horsfield. = *Linsang* Gray.*Poiana* Gray.

## C. GALIDIINAE.

*Galidia* I. Geoff.

## D. HEMIGALINAE.

*Hemigale* Jourdan.

## E. PARADOXURINAE.

*Nandinia* Gray.*Paradoxurus* F. Cuv.*Paguma* Gray.*Arctogale* Peters.

## F. ARCTIOTIDINAE.

*Arctictis* Temm. = *Ictides* F. Cuv.

## G. CYNOGALINAE.

*Cynogale* Gray.

## H. HERPESTINAE.

*Galidictis* I. Geoff.*Herpestes* Illig.*Athylax* F. Cuv.*Calogale* Gray.*Galerella* Gray.*Calictis* Gray.*Ariela* Gray.*Ichneumia* I. Geoff.*Bdeogale* Peters.*Urva* Hodgson.*Taeniogale* Gray.*Onychogale* Gray.*Helogale* Gray.

## I. CYNICTIDINAE.

*Cynictis* Ogilby.

## J. RHINO GALINAE.

*Rhinogale* Gray.*Mungos* Ogilby.



## K. CROSSARCHINAE.

*Crossarchus* F. Cuv.*Suricata* Desm. = *Rhysana*, Illig.*Extinct Viverridae?**Paleonyctis* Blainv.*Soricictis* Pomel.*Amphichneumon* Pomel.*Galeotherium* Wagner, (not Jacq.)

## XIV. EUPLERIDAE.

*Single genus.**Eupleres* Doyère.

## SUPER-FAMILY CYNOIDEA.

## XV. CANIDAE.

## SUB-FAMILIES.

I. Sectorial tooth of upper jaw elongated, and with the antero-internal lobe projecting directly inwards; of lower jaw, elongated and narrowed forwards and with the externo-median lobe enlarged: true molars in upper jaw two (rarely one), tubercular.

CANINAE. (A.)

II. Sectorial tooth of upper jaw abbreviated, triangular, and with the antero-internal lobe large and ledge-like; of lower jaw, comparatively short and broad forwards, and with the externo-median lobe reduced; true molars of upper jaw three, tubercular.

MEGALOTINAE. (B.)

## A. CANINAE.

‡. 1.

*Lycaon* Brookes.

‡. 2.

*Icticyon* Lund = *Cynalicus* Gray = *Melictes* Schinz.

‡. 3.

*Cyon* Hodgson.

‡. 4.

*Canis* Linn.*Canis* = *Canis* + *Lupus* Gray.*Simenia* Gray.*Lycalopex* Burm.*Pseudalopex* Burm.*Lycalopex* Gray.*Dieba* Gray.*Crysocyon* H. Smith.*Thous* Gray.

‡. 5.

*Vulpes*.*Vulpes*.*Fennecus* Gray.*Leucocyon* Gray.

‡. 6.

*Urocyon* Baird.

*Nyctereutes* Temminck.

**B. MEGALOTINAE.**

*Megalotis* Blainv. = *Agriodius* H. Smith = *Otocyon* Licht.

*Extinct Canidae? incertae sedis.*

*Amphicyon* Lartet.

*Cynodon* Aym.

*Galecyne* Owen.

*Palæocyon* Lund, (not Blainv.)

*Speothos* Lund.

**SUPER-FAMILY ARCTOIDEA.**

**XVI. MUSTELIDAE.**

**SUB-FAMILIES.**

I. Skull with the cerebral portion comparatively compressed backwards; and with the rostral portion comparatively produced, attenuated, and transversely convex above; anteorbital foramen small and opening forwards. Feet with little developed or no interdigital membrane.

A. Auditory bulla much inflated, undivided, bulging, and convex forwards; periotic region extending little outwards or backwards. Palate moderately emarginated.

1. Last molar of upper jaw ( $M \frac{1}{1}$ ) transverse, (with the inner ledge inflated at its inner angle;) sectorial tooth with a single inner cusp.

a.  $M \frac{1}{2}$ ; First true molar (sectorial) of lower jaw followed by a small second (tubercular) one. Toes short, regularly arched, and with the last phalanges bent up, withdrawing the claws into sheaths. (Gray.)

**MUSTELINAE. (A.)**

b.  $M \frac{1}{1}$ ; first true molar (sectorial) of lower jaw only developed. Toes straight, with the last phalanges and claws extended; the latter non-retractile. (Gray.)

**MELLIVORINAE. (B.)**

2. Last molar of upper jaw ( $M \frac{1}{1}$ ) enlarged and more or less extended longitudinally.— $M \frac{1}{2}$ . Toes straight, with the last phalanges and claws extended; the latter non-retractile. (Gray.)

**MELINAE. (C.)**

B. Auditory bulla elongated and extending backwards close to the par-occipital process. (Flower.) Palate moderately emarginated.

1. Last molar of upper jaw ( $M \frac{1}{1}$ ) transverse; (with the inner ledge narrowed inwards): sectorial tooth with two inner cusps.

**HELIOTIDINAE. (D.)**

C. Auditory bulla inflated, undivided, with the anterior inferior extremity pointed and commonly united to the prolonged hamular process of the pterygoid. (Flower.) Palate moderately emarginated.

1. Last molar of upper jaw ( $M \frac{1}{1}$ ) transverse; (with the inner ledge compressed).

**SOBOLLINAE. (E.)**

- D. Auditory bulla little inflated, transversely constricted behind the meatus auditorius externus and thence inwards; in front flattened forwards: periotic region expanded outwards and backwards. Palate deeply emarginated.

1. Last molar of upper jaw ( $M \frac{1}{1}$ ) quadrangular, wide, but with an extended outer incisorial ledge.

**MEPHITINAE. (D.)**

- II. Skull with the cerebral portion swollen backwards and outwards; and with the rostral portion abbreviated, high and truncated forwards, and widened and depressed above: anteorbital foramen enlarged and produced downwards and backwards. Feet with well-developed interdigital membrane, and adapted for swimming.

- A. Teeth normal; 36 ( $M \frac{1}{1}$ ,  $PM \frac{1}{1}$ ,  $C \frac{1}{1}$ ,  $I \frac{3}{3} \times 2$ ): sectorial tooth ( $PM \frac{4}{4}$ ) normal, efficient, with an expanded inner ledge; the other molars submusteline. Posterior feet with normally long digits.

**LUTRINAE. (G.)**

- B. Teeth very aberrant, 32 ( $M \frac{1}{1}$ ,  $PM \frac{3}{3}$ ,  $C \frac{1}{1}$ ,  $I \frac{3}{3}$ —the lower inner incisors being lost— $\times 2$ ): sectorial tooth ( $PM \frac{4}{4}$ ) defunctionalized as such, compressed from before backwards; the other molars also with blunted cusps. Posterior feet with elongated digits.

**ENHYDRINAE. (H.)**

**A. MUSTELINAE.**

§. 1.

(Digitigrade.)

*Mustela* L., Cuv.=*Martes* Gray (Les Martes—*Mustela* Cuv.).

*Putorius* Cuv.=*Foetorius* Kays. and Blas.

*Putorius* Gray.

*Gymnopus* Gray.

*Gale* Wagner=*Mustela* Gray, not Cuv.

*Lutreola* Wagner=*Vison* Gray.

§. 2.

(Plantigrade.)

*Galictis* Bell=*Eirara* Lund.

*Galera* Gray.

*Grisonia* Gray.

§. 3.

(Sub-plantigrade.)

*Gulo* Storr.

**B. MELINAE.**

*Taxidea* Waterh.

*Meles* Storr=*Taxus* Cuv.

*Mydaus* F. Cuv.

*Arctonyx* F. Cuv.=*Synarchus* Gloger.

August, 1871.

## C. MELLIVORINAE.

*Mellivora* Storr=*Ratelus* Gray=*Lipotes* Lund.

## D. MEPHITINAE.

*Conepatus* Gray=*Thiosmus* Licht. < *Marputius* Gray.

*Mephitis* Cuv., Gray.

*Spilogale* Gray.

## E. BORILLINAE.

*Zorilla* Gray=*Rhabdogale* Wagn.=*Ictonyx* Lund.

## F. HELICTODINAE.

*Helictis* Gray=*Melogale* I. Geoff.=*Rhinogale* Gloger, not Gray.

## G. LUTRINAE.

## §. 1.

*Barangia* Gray=*Leptonyx* Less., Gerv.

*Aonyx* Less., Gerv., Gray.

*Lontra* Gray=*Saricovia* Less.=*Loutra* Gerv. (misprint).

*Lutra* Linn.

*Lutra* Gray.

*Nutria* Gray.

*Lutronectes* Gray.

*Hydrogale* Gray.

*Latax* Gray (not Gloger)=*Lataxia* Gerv.

## §. 2.

*Pteronura* Gray, Gerv.=*Pterura* Wiegman.

## H. ENHYDRINAE.

*Enhydria* Fleming=*Latax* Gloger.

*Extinct Mustelidæ? incertæ sedis.*

*Palaeomephitis* Jäger=*Palaeobassar* Paul von Wurt.

*Palaeogale* Meyer.

*Plesiogale* Pomel.

*Plesiictis* Pomel.

*Putoriodus* Pomel.

*Potamotherium* Geoff.=? *Lutrictis* Pomel=? *Stephanodon* Meyer.

*Thalassictis* Nordm

*Galeotherium* Jäger (not Wagner).

*Enhydriodon* Falc.=*Amyxodon* Falc.

*Ursitaxus* Falc.

## XVII. URSIDAE.

## Genera.

## §. 1.

*Thalassarcos* Gray.

*Ursus* Linn.

*Ursus* Gray.  
*Tremarctos* Gerv.  
*Helarctos* Horsf.

*Myrmarcos* Gray.

§. 2.

*Melursus* Meyer=*Prochilus* Ill.

*Extinct Ursidae?*

(Family? *Hyaenarctidae?*)

*Hyaenarctos* Cautl. and Falc.=*Agriotherium* Wagn.=*Sivalarctos*+*Amphiarctos* Blainv.  
 =*Hemicyon* Lartet.

**XVIII. AELURIDAE.**

*Genus.*

*Aelurus* F. Cuv.

**XIX. CERCOLEPTIDAE.**

*Genus.*

*Cercoleptes* Illiger=*Kinkojou* Lac.=*Potos* Cuv.=*Caudivolvulus* Desm.

**XX. PROCYONIDAE.**

**SUB-FAMILIES.**

I. Snout attenuated. Auditory bulla small, abruptly contracted, flattened forwards and towards the external auditory meatus. Mastoid process little developed, extrorse behind meatus.

**NASUINAE. (A.)**

II. Snout comparatively abbreviated. Auditory bulla large, sloping gradually towards the external auditory meatus. Mastoid process enlarged and prolonged downwards.

**PROCYONINAE. (B.)**

**A. NASUINAE.**

*Nasua* Storr=*Coati* Lac.

**B. PROCYONINAE.**

*Procyon* Storr.

*Procyonidae?* of extinct genera.

*Tylodon* Gerv.

*Leptarctos* Leidy.

**XXI. BASSARIDIDAE.**

*Genus.*

*Bassaris* Licht.

**FISSIPEDIA INCERTAE SEDIS.**

**XXII. SIMOCYONIDAE.**

*Extinct.*

*Simocyon* Kaup=*Diaphorus* Gaudry..

**XXIII. ARCTOCYONIDAE.***Extinct.**Arctocyon* Blainv. + *Palaeocyon* Blainv. (not Lund).**XXIV. HYAENODONTIDAE.***Extinct.**Hyaenodon* de Laiz & de Par. = ? *Hyaenodon* + *Taxotherium* + *Pterodon* Blainv.*Fissipedium* Genera incertae sedis.*Acanthodon* Meyer.*Harpagodon* Meyer.*Patriofelis* Leidy.*Sinopa* Leidy.

(Hyaenidae?)

*Lycyaena* Hensel.*Hyaenictis* Gaudry.

(Viverridae?)

*Ictitherium* Gaudry.**PINNIPEDIA.****FAMILIES.**

I. Molar teeth  $\frac{5}{2}$  or  $\frac{4}{2}$ ; canines of both jaws moderately developed, those of upper jaw being scarcely larger than those of lower; incisors persistent. (*Phocoidea*.)

A. Form comparatively archetypical, with the hinder legs flexible forwards. Small ear conchs developed. Skull with the mastoid processes strong and salient, standing aloof from the auditory bullae; with well-developed post-orbital processes, and alisphenoid canals. Incisors ( $\frac{3}{2}$ ) of upper jaw notched. Anterior limbs about as large as the posterior; their feet with digits decreasing in a curved line and without claws; posterior feet with all their digits nearly co-terminal and furnished with long linguiform flaps extending beyond their tips; the three middle toes alone clawed.

**OTARIIDAE. (XXV.)**

B. Form atypically phociform, with the hinder legs projected backwards and not flexible forwards. Ear conchs obsolete. Skull with the mastoid processes swollen, and seeming to form part of the auditory bullae; the post-orbital processes null or obsolete; no alisphenoid canals. Incisors (variable in number— $\frac{3}{2}$  or  $\frac{4}{2}$ , or  $\frac{1}{2}$ —) of upper jaw not notched. Anterior limbs smaller than the posterior; the feet with the digits successively abbreviated and armed with claws; the posterior flippers emarginated (the third and fourth digits being shortest), and provided with claws (rarely suppressed).

**PHOCIDAE. (XXVI.)**

II. Molar teeth  $\frac{1}{2}$   $\frac{1}{2}$ , the posterior generally caducous in adult: canines of upper jaw greatly hypertrophied and developed as tusks; those of lower jaw atrophied: incisors, except external of upper jaw, deciduous. (*Rosmaroidea*.)

A. Form comparatively etypical, with the hinder legs flexible forwards. Ear conchs obsolete. Skull with the mastoid processes strong and salient; the surface continuous with the auditory bullae; no postorbital processes; distinct alisphenoid canals. Anterior limbs about as large as posterior; feet with the toes decreasing in a curved line, destitute of claws: posterior feet with the five digits scarcely increasing toward inner; all provided with claws.

**ROSMARIDAE. (XXVII.)**

**SUPER-FAMILY PHOCOIDEA.**

**XXV. OTARIIDAE.**

*Genera.*

§. 1.

*Zalophus* Gill.

*Zalophus sensu strict.*

*Neophoca* Gray.

§. 2.

*Eumetopias* Gill.

*Otaria* Peron.

*Otaria sensu strict.*

*Phocarcos* Peters, Gray.

*Arctocephalus* F. Cuv. = *Halarctos* Gill.

*Arctocephalus* Gray.

*Gypsophoca* Gray.

*Arctophoca* Peters = *Euotaria* Gray.

*Callirkinus* Gray.

**XXVI. PHOCIDAE.**

**SUB-FAMILIES.**

I. Maxillar zygomatic process with the posterior surface subvertical or very oblique. Malar oblong-rhomboid, emarginated above and below.

A. Intermaxillaries narrow, prolonged, and wedged behind between the supramaxillaries and nasals. Nasal bones narrow, diminishing in width backwards. Incisors  $\frac{1}{2}$ ; exceptionally  $\frac{1}{4}$ .

**PHOCINAE. (A.)**

B. Intermaxillaries terminating far from nasals. Nasal bones narrow and shortened. Incisors  $\frac{1}{4}$ .

**CYSTOPHORINAE. (B.)**

II. Maxillar zygomatic process with its lower and posterior surface extended horizontally backwards, and its angle continued far behind along the inner side of the malar. Malar elongated, bow-shaped, and curved upward in front.

A. Intermaxillaries narrow, not continued backward between nasals and supramaxillaries. Nasal cavity expanded, with the nasal bones widest toward the middle and very long. Incisors  $\frac{1}{4}$ .

**STENORHYNCHINAE. (C.)**

**A. PHOCINAE.****§. 1.***Phoca* Linn., Gill=*Callocephalus* F. Cuv., Gray.*Callocephalus* Gray.*Halicyon* Gray.*Pagomys* Gray.*Pagophilus* Gray.*Erignathus* Gill=*Phoca* Gray, not Linn.**§. 2.***Halichoerus* Nilss.**§. 3.***Monachus* Flem.=*Pelagios* F. Cuv.=*Heliphoca* Gray.**B. CYSTOPHORINAE.***Cystophora* Nilss.=*Stenmatopus* F. Cuv.*Macrorhinus* F. Cuv.=*Mirounga* Gray=*Macrorhyna* Gray=*Morunga* Gray.**C. STENORHYNCHINAE.***Iobodon* Gray.*Stenorhynchus* F. Cuv.*Leptonychotes*=*Leptonyx* Gray, not Sw. 1821.*Ommatophoca* Gray.*Extinct Phocidae?**Pachyodon* Meyer.*Pristiphoca* Gerv.**SUPER-FAMILY ROSMAROIDEA.****XXVII. ROSMARIDAE.***Single genus.**Rosmarus* Scop.=*Odobaenus* (Briss.) Ill.=*Trichechus* auct. pl., not Linn.*Extinct Rosmaridae.**Trichechodon* Lankester.**UNGULATA.****SUB-ORDERS.**

- I. Digits paired, the third and fourth being subequally developed and exerted; (the fifth, generally, nearly corresponding in size and position to the second, and, generally, developed—or atrophied—in nearly equal degree;) the articulating phalanges and proximal carpal and tarsal bones correspondingly modified. Astragalus with its anterior or inferior articular surface divided by a crest into two sub-equal facets. Femur without a third trochanter, and with its shaft generally perforated at the fore and



upper part by the medullary artery. Dorso-lumbar vertebrae, generally, nineteen in number (d. 12—15+l. 7—4.) Skull with the intermaxillary bones flattened above towards the symphysis, and with the incisors, when present, diverging towards their roots. Stomach more or less subdivided or complex: coecum comparatively small and simple.

## ARTIODACTYLA.

- II. Digits unpaired or unequal, the third being the largest and most exerted; (the fourth nearly co-equal in size and position with the second; fifth—of hind foot, at least,—atrophied;) the articulating phalanges and carpal and tarsal bones correspondingly modified. Astragalus with the anterior or inferior articular surface divided into two very unequal facets. Femur with a third trochanter, and with its shaft perforated at the back-part by the medullary artery. Dorso-lumbar vertebrae not less than twenty-two in number (d. 18—19+l. 3—6). Skull with the intermaxillary bones tectiform above and united towards the symphysis, and with the incisors, when present, implanted subvertically and nearly parallel to their roots. Stomach simple: coecum very much enlarged and sacculated.

## PERISSODACTYLA.

## ARTIODACTYLA.

### FAMILIES.

- I. Molars (M) atypically each with two double crescentiform folds, whose convex surfaces are internal. Canines of lower jaw, atypically, resembling, and parallel with, incisors; (differentiated and specialized in Camelidae). Palatine bones contracted and compressed behind, thin, and (at the walls of the posterior nares) separated by a wide sinus from the terminal portion of the supramaxillary bones. Digestive system adapted for rumination: stomach tripartite, or, atypically, quadripartite, a "paal-terium" being finally developed.—Axis with the olontoid process like a spout, or hollow half-cylinder, and with a prominent sharp semi-circular rim. (Flower.)—(*Pecora*; or, *Ruminantia*.)

- \* Incisors deciduous from upper as well as lower jaws. Canines of lower jaw inclined forwards, with compressed cuneate crowns. Placenta and stomach unknown. *Chalicotheroidea*.

One family.

### CHALICOTHERIIDAE. (XXVII a.)

\*\* Incisors persistent in lower jaw.

- A. Hind limbs with the proximal joint (femur) exerted and not contained within the common integument. Canines of lower jaw specialized and differentiated from incisors. Incisors in part (i. e. lateral) persistent in upper jaw. Placenta diffuse. Stomach imperfectly quadripartite. (*Pecora tylopoda* s. *phalangrada*.)

One family.

### CAMELIDAE. (XXVIII.)

- B. Hind limbs with the proximal joint (femur) not exerted but inclosed within the common integument. Canines of lower jaw similar to and

parallel with the incisors. Incisors deciduous from upper jaw; persistent in lower. Placenta and stomach diversiform. (*Pecora unguligrada*.)

1. Placenta polycotyledonary. Stomach quadripartite, a well-developed psalterium being differentiated. Incisorial series of lower jaw uninterrupted at the symphysis. (*Pecora unguligrada typica*.)

a. Neck very long and slender, the cervical vertebrae (3-7) being much elongated: the dorso-lumbar vertebrae comparatively abbreviated and declining backwards, the hinder limbs being shorter than, or as short as, the anterior. Horns developed as epiphyses of the frontals, and covered with an extension of the skin. (*Giraffoidea*.)

One family.

#### GIRAFFIDAE. (XXIX.)

b. Neck comparatively more or less short, the cervical vertebrae (3-7) being normally developed: the dorso-lumbar vertebrae longer, and highest backwards, the hinder limbs being considerably longer than the anterior. Horns diversiform. (*Booidea*.)

1. Skull with the auditory bulla produced downwards, especially towards the inside, and applied behind to the paroccipital process. Styloid process deflected more or less forwards and enclosed in an oblique fold on the outer surface of the auditory bulla. Palatine axis declivous from the occipito-sphenoid axis. (*Booidea typica*.)

a. Horns persistent, (common to both sexes,) and developed as sheaths of true "horn" on osseous cores originating from the frontal bones. Styloid process partially enclosed in a more or less open canal.

a. 1. Olfactory organ extremely expanded and inflated above: nasal bones much abbreviated, arched upwards, and entirely separated from the supra-maxillaries as well as lachrymals, the frontals projecting between the latter and the nasals. Supra-maxillaries and inter-maxillaries reduced and attenuated forwards. Posterior nasal cavity with walls inflated outwards.

#### SAIGIIDAE. (XXX.)

a. 2. Olfactory organ normally developed: nasal bones elongated, straight or declining forwards, and connected by suture with the lachrymals, supra-maxillaries and sometimes with the inter-maxillaries. Supra-maxillaries and inter-maxillaries well-developed forwards.

#### BOVIDAE. (XXXI.)

b. Horns deciduous, peculiar to the rutting season, (in both sexes,) developed as pseudocorneous sheaths with agglutinated hairs on osseous cores originating from the frontal bones. Sty-

loid process completely inclosed in a canal by the lateral extension of the base of the bony meatus auditorius.

**ANTILOCAPRIDAE. (XXXII.)**

- ii. Skull with the auditory bulla little produced downwards and applied only to the inner surface of the paroccipital process. Styloid process directed downwards, interposed between the bulla and paroccipital process, and not inclosed in an oblique fold of the auditory bulla. Palatine axis nearly parallel with the occipito-sphenoid axis. (*Booidea cerviformia*.)

One family.

**CERVIDAE. (XXXIII.)**

2. Placenta diffuse. Stomach tripartite, the psalterium being undeveloped. Incisorial series of lower jaw interrupted at symphysis, (the middle incisors very enlarged and expanded towards their crowns.) (*Pecora unguligrada traguloidea*.)

One family.

**TRAGULIDAE. (XXXIV.)**

3. Familiae incertae sedis.

- a. Skull broad behind, in front of the molars contracted forwards, with the facial portion produced downwards and abbreviated, and with the nasal bones abbreviated and longitudinally arched. Molars ( $M \frac{3}{4}$ ,  $PM \frac{3}{4}$ ;) broad; inner crescentic plates of enamel running zig-zag-wise in large sinuous flexures. Horns in two pairs.

**SIVATHERIIDAE. (XXXV.)**

- b. Skull with the parietals and supraoccipital extended far backwards, and contracted forwards in front of the molars, with the facial portion normally produced. Molars ( $M \frac{3}{4}$ ,  $PM \frac{3}{4}$ ;) broad; inner crescentic plates of enamel describing a simple curve. Horns none, (in both sexes?)

**HELLADOTHERIIDAE. (XXXVI.)**

- C. Hind limbs with the proximal joint (femur) not exerted, but inclosed within the common integument (*Inferential*). Canines of lower jaw similar to and parallel with the incisors. Incisors all (I 3-3) persistent in upper jaw. ( $M \frac{3}{4}$ ,  $PM \frac{3}{4}$ ,  $C \frac{1}{2}$ ,  $I \frac{3}{4} \times 2 = 44$ .) Placenta diffuse (*Inferential*). Stomach tripartite, the psalterium being undeveloped (*Inferential*). (*Pecora dentata*.)

1. Teeth of both jaws in an interrupted series, the canines of the upper jaw being enlarged, and the first premolar of the lower caniniform, and received in diastemas of the opposite jaw. (*Oreodontioidea*.)

**OREODONTIDAE. (XXXVII.)**

2. Teeth of both jaws in a nearly or quite uninterrupted series, the canines and first premolars of neither jaws projecting. (*Anoplotheroidea*.)

- a. Body somewhat cerviform, with the hind limbs little longer than the fore, (having the relative length normal to walking quadrupeds.) Teeth comparatively uniform.

**ANOPLOTHERIIDAE. (XXXVIII.)**

- b. Body somewhat leporiform, with the hind limbs much longer than the fore, (as in the Leporids.) Teeth comparatively differentiated.

#### DICHOBUNIDAE. (XXXIX.)

II. Molars (M) atypically tuberculiferous. Canines of lower jaw enlarged and often developed as tusks, entirely differentiated and distant from incisors. Palatine bones scarcely contracted behind, thick, and (at the walls of the posterior nares) articulated with the terminal portion of the supramaxillary bones. Digestive system not adapted for rumination: stomach imperfectly septate.—Axis with the odontoid process conical. (Flower.)—(*Omnivora*.)

A. Body massive, with the feet phalangigrade, and their external (2, 5) toes well developed and produced as far as or beyond the first phalanges of the middle (3—4) toes; the last phalanges wide and with convex margins: manus with unciform bone much broader than high, and with second phalanx wedged between trapezoid and magnum; pes with cuboid broader than high. Lower jaw with a deep preangular expansion directed forwards. (Snout rounded and with the nostrils open upwards and sideways. Mammas two, inguinal.) *Obesa*.

! Molars of upper jaw with a bow-shaped (convex extrorsely) longitudinal and a straight transverse valley dividing four tubercles, all of which are convex introrsely (towards the palate) and concave externally, (thus simulating the teeth of ruminants.) Molars of lower jaw narrower than those of upper, and with the longitudinal valley very narrow: (last molar with a supplementary posterior lobe.) Canines comparatively small and cylindro-conic. (*Merycopotamoidea*.)

#### MERYCOPOTAMIDAE. (XL.)

! Molars (M) of upper jaw with nearly straight or irregularly sinuous longitudinal and transverse valleys dividing four tubercles, of which the external two are convex extrorsely and the inner two convex introrsely (towards the palate.) Molars of lower jaw resembling those of upper, (the last molar with a supplementary posterior lobe.) Canines very large and furrowed along their posterior surface. (*Hippopotamoidea*.)

#### HIPPOTOTAMIDAE. (XLI.)

B. Body sniform; with the feet unguligrade, and their external toes reduced in size and not produced or assisting in progression; the last phalanges elongated and trihedral: manus with the unciform little or no broader than deep, and with the second phalanx not wedged between the trapezoid and magnum; pes with cuboid deeper than broad and emarginated behind. Lower jaw with no preangular expansion. (Snout disciform and with the nostrils in it and open forwards. Mammas in increased number (4 to 10), ventral as well as inguinal.) *Setifera*.

1. True molars of upper jaw with oblong crowns with four or more principal sub-conical lobes and accessory smaller ones.

a. Occipital bone with long deflected styliform paroccipital processes in front of the occipital condyles, and emitting transverse internal ridges in which are the condyloid foramina. Squamosals with their articular processes projecting directly outwards from their bases (and thus aloof from the auditory bullae), and with the zygomatic processes overlying the malar bones. Pterygoid bones twisted and reflected outwards: the crest continued upwards and backwards into the temporal region. Articular surface for lower jaw transversely concave, antero-posteriorly convex, and with no post-glenoid process. Lower jaw with triangular condyles. Canine teeth of upper jaw (in males) more or less twisted outwards and upwards and parallel with the lower. Back with no dorsal scent gland. (*Setifera suiformia*.)

i. Skull with the palato-maxillary axis extremely deflected and forming a high angle with the occipito-sphenoidal axis. Basisphenoid reflected (with a crest uniting with the presphenoid), and forming two deep pocket-like cavities. Orbits directed upwards and backwards. Malar bones very deep, and with a short inferior process. Dental series aberrant (molars reduced (in old) to true (M 1—3) or even last true molar): last or third true molar elongated and composed of three longitudinal rows of columnar tubercles presenting, when worn, simple oval insular areas. (Incisors, in adults, reduced to 2 (or none) in upper, and sometimes none in lower jaw.)

**PHACOCHOERIDAE. (XLII.)**

ii. Skull with the palato-maxillary axis little deflected, and nearly parallel with the occipito-sphenoidal axis. Basisphenoid normal, and with no burriform cavities. Orbits directed outwards and forwards. Malar bones elongated and with a long inferior process. Dental series normal (M  $\frac{3}{2}$  × 2, PM  $\frac{4}{2}$  × 2, C  $\frac{1}{2}$  × 2, I  $\frac{3}{2}$  × 2 = 44): molars with corrugated cusps presenting, when worn, deeply sinuated insular areas.

**SUIDAE. (XLIII.)**

b. Occipital bone with short backward-directed paroccipital processes originating sideways from the occipital condyles, and emitting a transverse internal ridge continuous with the anterior margin of the bone, behind which are the condyloid foramina. Squamosals with their articular processes deflected from their bases and bounding the outside of the auditory bullae, and with the zygomatic processes articulating obliquely with the malar bones. Pterygoid bones simply curved outwards: the crest with a crest-like anterior process of the squamosal in front of the auditory bullae. Glenoid fossa curved and transversely concave, antero-posteriorly concave and with a distinct post-glenoid process. Lower jaw with transverse condyles. Canine teeth of upper jaw simply decurved, very acute and trenchant behind. Back with a posterior dorsal scent gland. (*Setifera dicotyliformia*.)

One family.

**DICOTYLIDAE. (XLIV.)**

2. True molars of upper jaw with quadrate crowns, with four principal pyramidal and more or less distinctly trihedral lobes, divided by deep valleys, not filled up by cement, but, in some genera, interrupted with minor tubercles and ridges. (Owen.) Orbits, atypically, with a continuous margin behind. Lower jaw, atypically, with a tubercle projecting outwards. (*Anthracotheroidea*.)

**ANTHRACOTHEREIIDAE. (XLV.)**

**ARTIODACTYLI? INCERTAE SEDIS.**

**SUPER-FAMILY CHALICOTHEREOIDEA.**

**XXVIIIa. CHALICOTHEREIIDAE.**

*Chalicotherium* Kaup., Falc.

**PECORA.**

**SUPER-FAMILY CAMELOIDEA.**

**XXVIII. CAMELIDAE.**

*Genera.*

*Camelus* Linn.

*Auchenia* Ill.

*Extinct Camelidae.*

*Merycotherium* Bojanus.

*Poebrotherium* Leidy.

*Procamelus* Leidy.

*Megalomeryx* Leidy.

*Homocamelus* Leidy.

*Protomeryx* Leidy.

*Merycodus* Leidy.

*Camelops* Leidy.

*Pulauchenia* Owen.

**SUPER-FAMILY GIRAFFOIDEA.**

**XXIX. GIRAFFIDAE.**

*Single genus.*

*Giraffa* Storr ex. Briss. = *Camelopardalis* Cuv.

**SUPER-FAMILY BOOIDEA.**

**XXX. SAIGIIDAE.**

*Genus.*

*Saiga* Gray.

**XXXI. BOVIDIAE.**

**SUB-FAMILIES.**

(*Fide auct. plur.*)

- I. Form massive, with the head declined; with the neck abbreviated, the third and succeeding vertebrae being much shortened. Legs stout, and

with the metacarpals and metatarsals little or no longer than the phalanges with hoofs.

- A. Molars comparatively broad, without supplemental lobes. The basioccipital bone with its tubercles well developed, and a deep groove between them. (Turner.)

BOVINAE. (A.)

- B. Molars comparatively narrow, with supplemental lobes. The basioccipital bone broad and flat, with a ridge and a fossa on each side. (Turner.)

OVIPOVINAE. (B.)

II. Form slender, with the head more or less uplifted; with the neck comparatively lengthened, the third and succeeding vertebrae being not much shorter than thick. Legs slender, and with the metacarpals and metatarsals much longer than the phalanges with hoofs.

1. Horns diversiform (definable by no common characters), conical, cylindrical, or compressed; or, sub-angular, with a sub-spiral ridge originating at the base anteriorly; or, variously contorted.

ANTILOPINAE. (C.)

2. Horns curved backwards, sub-angular, with a rectilinear ridge anteriorly continuous around the convex curve.

CAPRINAE. (D.)

3. Horns curved outwards and forwards or sub-spiral, sub-angular, with a rectilinear ridge continuous around the convex curve.

OVINAE. (E.)

#### A. BOVINAE.

*Bos* Linn.

*Bibos* Hodgson.

*Bibos* sensu strict.

*Probos* Hodgson.

*Bubalus* H. Smith.

*Bubalus* sensu strict.

*Syncerus* Hodgson.

*Hemibos* Falc. (Extinct.)

*Amphibos* Falc. (Extinct.)

*Anoa* Leach.

*Poëphagus* Gray.

*Bison* H. Smith = *Bonasus* Wagn.

#### B. OVIPOVINAE.

*Oribos* Blainv.

*Ovibos* sensu strict.

*Bootherium* Leidy. (Extinct.)

#### C. ANTILOPINAE.

##### §. 1.

(*Strepsiceros* Turner.)

*Strepsiceros* H. Smith.

*Oreas* Desm.

*Tragelaphus* Blainv.

## §. 2.

( *Gazella* Turner.)*Pantholops* Hodgson, Gray, Gerv.*Procapra* Hodgson.*Gazella* Blainv.*Tragops* Hodgson.*Antidorcas* Sund.( *Antilope* Turner.)*Æpyceros* Sund.( *Cervicapra* Turner.)*Antilope* Blainv.( *Tetraceros* Turner.)*Tetraceros* Leach.( *Oreotragus* Turner.)*Calotragus* Sund.*Scopophorus* Gray.*Oreotragus* Gray.( *Neotragus* Turner.)*Nesotragus* Von Duben.( *Cephalophus* Turner.)*Cephalophus* H. Smith.( *Eleotragus* Turner.)*Nanotragus* Sund.*Pelea* Gray.*Eleotragus* Gray.*Adenota* Gray.*Kobus* H. Smith.

## §. 8.

( *Catoblepas* Turner.)*Connocetes* Licht.*Connocetes* Gray.*Gorgon* Gray.( *Alcelaphus* Turner.)*Alcelaphus* Blainv.*Damalis* H. Smith=*Gazella* §. Gerv.

## §. 4.

( *Nemorhaedus* Turner.)*Capricornis* Ogilby.*Nemorhaedus* H. Smith.( *Budorcas* Turner.)*Budorcas* Hodgson.

## §. 5.

( *Apolceros* Turner.)*Mazama* Raf., Gray=*Aploceros* H. Smith=*Antilocapra* Gerv.( *Rupicapra* Turner.)*Rupicapra* Blainv., Gray=*Capella* K. and B.



## §. 6.

*Aegoceros* H. Smith, Turner=*Hippotragus* Sund.

*Oryx* Blainv., Turner.

*Addax* Gray, Turner.

## §. 7.

(*Portax* Turner.)

*Portax* H. Smith.

## D. CAPRINAE.

*Hemitragus* Gray.

*Hemitragus* Gray.

*Kemas* Ogilby, Gray, Gerv.

*Capra* Linn.

*Aegoceros* (Pall., Gray (p. 147, not p. 142).

*Iber* (Pall.), Gerv.=*Capra* Gray.

*Capra* (Linn.), Gerv.=*Hircus* Gray.

## E. OVINAE.

*Ovis* Linn.

*Ovis* sensu strict.

*Caprovis* Hodgson=*Musimon* Gray, Gerv.

*Pseudovis* Hodgson.

*Ammotragus* Blyth.

*Extinct genera.*

(*Antilopinas.*)

*Palaeotragus* Gaudry.

*Palaeoryx* Gaudry.

*Tragoceros* Gaudry.

*Palaeoreas* Gaudry.

*Antidorcas* Gaudry.

(*Bovidae? incertae sedis.*)

*Leptotherium* Lund.

*Cosoryx* Leidy.

## XXXII. ANTILOCAFRIDAE.

*Genus.*

*Antilocapra* Ord=*Dicranoceros* H. Smith.

## XXXIII. CERVIDAE.

SUB-FAMILIES.

## I. Horns developed.

A. Canine teeth small or none.

CERVINAE. (A.)

B. Canine tooth of male enlarged and tusk-like.

CERVULINAE. (B.)

## II. Horns not developed.

A. Canine teeth of male enlarged and tusk-like.

MOSCHINAE. (C.)

**A. CERVINAE.**

(Genera fide Solater.)

## §. 1.

*Alces* H. Smith.

## §. 2.

*Rangifer* H. Smith=*Tarandus* Ogilby.

## §. 3.

*Dama* H. Smith.*Cervus* Linn., Solater.*Cervus sensu strict.**Elaphurus* A. M. Edw.*Rusa* Hodgson.*Axis* Hodgson.*Blastoceros* Sund.*Coassus* Gray.*Capreolus* Gray.*Sika* Hodgson.*Rucervus* Hodgson=*Panolia**Hyelaphus* Sund. [Gray.]*Cariacus* Gray.*Furcifer* Sund.*Pudu* Gray.**B. CERVULINAE.***Cervulus* Blainv.=*Muntiacus* Gray=*Styllocerus* H. Smith=*Prox* Ogilby.**C. MOSCHINAE.***Moschus* Linn.*Hydropotes* Swinhoe.*Extinct.*

(Cervinae.)

*Megaceros* Owen.

(Cervidae? related to Moschinas?)

*Dremotherium* E. Geoff.*Amphitragulus* Pomel=*Tragulotherium* Croizet.*Dorcatherium* Kaup.*Leptomeryx* Leidy.**SUPER-FAMILY TRAGULOIDEA.****XXXIV. TRAGULIDAE.***Genera.*

## §. 1.

*Tragulus* Briss.*Tragulus sensu strict.**Meminna* Gray.

## §. 2.

*Hyomoschus* Gray.**SUPER-FAMILY? SIVATHEROIDEA.****XXXV. SIVATHERIIDAE.***Extinct.**Sivatherium* Falc. and Cantl.

*Incertæ sedis.*

*Bramatherium* Falc. and Cautl.

**SUPER-FAMILY ? HELLADOTHERIOIDEA.**

**XXXVI. HELLADOTHERIIDAE.**

*Extinct.*

*Helladotherium* Gaudry.

**SUPER-FAMILY OREODONTOIDEA.**

**XXXVII. OREODONTIDAE.**

*Extinct.*

A. Orbit complete behind. Lachrymal bone impressed by a well-marked fossa. (Leidy.)

OREODONTINAE. (A.)

B Orbit incomplete behind. Lachrymal bone with no fossa. (Leidy.)

AGRIOCHOERIDAE. (B.)

**A. OREODONTINAE.**

*Oreodon* Leidy = *Merycoidodon* Leidy = *Cotylops* Leidy. (*Fide* Leidy.)

*Merycochoerus* Leidy.

*Merychys* Leidy.

*Leptauchenia* Leidy.

**B. AGRIOCHOERIDAE.**

*Agriochoerus* Leidy. = ? *Eucrotaphus* Leidy.

**SUPER-FAMILY ANOPLOTHERIOIDEA.**

**XXXVIII. ANOPLOTHERIIDAE.**

*Extinct.*

*Anoplotherium* Cuv.

*Eurytherium* Gervais.

**XXXIX. DICHOBUNIDAE.**

*Extinct.*

(*Genera fide* Turner.)

*Caenotherium* Bravard = *Oplotherium* Laiz. and de Par.

*Dichodon* Owen.

*Dichobune* Cuv.

*Xiphodon* Cuv.

*Anoplotherioidea?* *incertæ sedis.*

*Tapinodon* v. Meyer, 1846.

*Choereomeryx* Pomel, 1848.

*Aphelotherium* Gervais.

**February, 1872**

*Cebochoerus* Gervais.

*Zooligus* Aymard.

*Diplocus* Aymard.

*Hyaegulus* Pomel.

*Microtherium* v. Meyer=*Amphimeryx* Pomel.

*Adapis* Cuv.

*Homaladotherium* Huxl.

## OMNIVORA.

### SUPER-FAMILY MERYCOPOTAMOIDEA.

#### XL. MERYCOPOTAMIDAE.

*Extinct.*

*Merycopotamus* Falco. and Cautl.

### SUPER-FAMILY HIPPOPOTAMOIDEA.

#### XLI. HIPPOPOTAMIDAE.

##### SUB-FAMILIES.

A. Skull depressed between the orbits and with the frontal sinus obsolete; the orbits prominent above the level of the forehead, and closed behind.

##### HIPPOPOTAMINAE. (A.)

B. Skull convex between the orbits and with the frontal sinus well developed; the orbits depressed below the level of the forehead and incomplete behind.

##### CHOEROPSINAE. (B.)

##### A. HIPPOPOTAMINAE.

*Hippopotamus* Linn.=*Tetraprotodon* Falco. and Cautl.

##### B. CHOEROPSINAE.

*Choeropsis* Leidy.

*Extinct.*

(*Hippopotaminae.*)

*Hexaprotodon* Falco. and Cautl.

### SUPER-FAMILY SETIFERA.

#### XLII. PHACOCHOERIDAE.

*Genus.*

*Phacochoerus* F. Cuv.=*Eureodon* G. Fisch.

*Extinct genus referred (erroneously?) to Phacochoeridae.*

*Calydonius* v. Meyer.

#### XLIII. SUIDAE.

§. 1.

*Babirussa* F. Cuv.=*Porcus* Wagler.

‡. 2.

*Potamochoerus* Gray=*Choiropotamus* Gray.*Sus* Linn.*Sus* Gray.*Scrofa* Gray.*Centuriosus* Gray=*Gyrosus* Gray=*Ptychochoerus* Fitz.*Porcula* Hodgson.*Extinct genus incerta sedis.**Hippohys* Falc. and Cautl.**XLIV. DICOTYLIDAE.***Genera.**Dicotyles* Cuv.*Notophorus* Gray.*Extinct.**Platygonus* Lec., Leidy.=*Hyops* Lec.=*Protochoerus* Lec.=*Euchoerus* Leidy. (*Fide* Leidy.)**SUPER-FAMILY ANTHRACOTHEROIDEA.****XLV. ANTHRACOTHERIIDAE.***Extinct.***SUB-FAMILIES.**

A. Premolars of upper jaw in part (PM 4) resembling the true molars, and with tubercles in transverse series ( $\frac{1}{1} \mid \frac{1}{1-2}$ ) separated by transverse vallies; the preceding (PM 3, 2, 1) successively more and more differentiated forwards.

**HYOPOTAMINAE (A.)**

B. Premolars (PM 4, 3, 2, 1) of upper jaw all differentiated from the true molars, and each with a conical crown and a small inner lobe.

**ANTHRACOTHERIINAE (B.)****A. HYOPOTAMINAE.***Hyopotamus* Owen.*Bothryodon* Aymard=*Ancodus* Pomel.**B. ANTHRACOTHERIINAE.***Anthracotheium* Cuv.*Elotherium* Pomel.**EXTINCT OMNIVORA? INCERTAE SEDIS.***Choeropotamus* Cuv.*Palaeochoerus* Pomel=*Cyclognathus* Croizet=*Brachygnathus* Pomel=*Synaphodus* Pomel.*Choeromorus* Lartet.*Entelodon* Aymard.*Heterohys* Gervais.*Acotherulum* Gervais.*Choerotherium* Falc.=*Tetraconodon* Falc.

*Titanotherium* Leidy.  
*Perchoerus* Leidy.  
*Leptochoerus* Leidy.  
*Nanohyus* Leidy.

## PERISSODACTYLI.

### FAMILIES.

I. Incisors (4? in lower jaw) in part gliriform, the outer having persistent pulps, and growing continuously in a circular direction. (*Anchippodontidea*.)

#### ANCHIPPODONTIDÆ. (XLV. a.)

II. Incisors not gliriform.

1. Middle digit and hoof hypertrophied and alone supporting the body, the lateral (second and fourth) digits being more or less atrophied and functionless, or (atypically) obsolete (reduced to the condition of "splint bones"). Femur with a fossa above the external condyle. Skull (atypically) much prolonged forwards. Molars subequal (not decreasing forwards) and cuboid; pre-molars (PM 3-4) also enlarged (not decreasing forwards) and (except second) cuboid; the second (PM 2) elongated; the first milk molar (D 1) more or less persistent and not replaced by a pre-molar (PM 1); disproportionately small. Incisors with a deep invaginated fold of enamel penetrating the interior from the crown, and producing a central cavity filled with cementum. (*Solidungula*.)

A. Ulna with the shaft atrophied and the extremities ankylosed and consolidated with the radius. Fibula rudimentary and ankylosed to the tibia. Skull with the orbit complete behind. Upper molars (PM and M)—at least, of second set—with a deep valley re-entering from the postorse portion of the inner side obliquely forwards, and (in connection with a more or less deep valley re-entering from the introrse portion of the anterior border or the angle) more or less isolating an introrse enamel lobe or area, and with two (anterior and posterior) crescentic enamel islands. Lower molars (PM 2, M 2) with a valley re-entering inwards from the outer wall, one from the introrse portion of the anterior wall, and another (terminating in anterior and posterior branches) from the posterior portion of the inner wall.

#### EQUIDÆ. (XLVL.)

B. Ulna with the shaft complete and moderately developed, and more or less differentiated from the radius. Fibula archetypically complete but archylosed with the tibia. Skull with the orbit incomplete behind. Upper molars (PM 3-4 and M) with a deep (anterior) valley re-entering from the middle of inner side inwards and forwards

and ending in lateral branches, and with a (posterior) valley re-entering from the posterior wall. Lower molars with a V-shaped valley re-entering from the outer wall, and two V-shaped valleys, re-entering from the inner wall (the crowns having W-shaped ridges)

#### ANCYTHERIIDAE. (XLVII.)

2. Middle digit and hoof not hypertrophied, and only in connection with the lateral supporting the body, the lateral being well developed and efficient. Femur without a fossa above the external condyle. Skull moderately prolonged forwards. Molars unequal (the first smaller than the second), diversiform; pre-molars decreasing in size forwards; first milk molar not persistent, but (generally) replaced by a pre-molar (PM 1) of moderate size. Incisors without an invaginated fold of enamel penetrating the interior.

A. Nasal region expanded or thrown backwards, the supramaxillary bones forming a more or less considerable portion of the border of the nasal aperture; the nasal bones contracted forwards, or atrophied. Molars with crowns traversed by more or less well-defined continuous ridges.

a. Upper molars with a continuous outer wall and without complete transverse crests. (*Rhinocerotoidae*.)

aa. Neck abbreviated. Incisor teeth (atypically) reduced in number or entirely suppressed. (*Rhinocerotoidae rhinocerotiformia*.)

\* Skull with the basioccipital comparatively well developed behind and narrowed forwards; (with tympanic and periotic bones ankylosed and wedged in between the squamosal, exoccipital and other adjacent cranial bones.—Huxley;) with the nasal bones produced forwards and more or less arched, and meeting an upward developed expansion of the supramaxillary bones. Upper molars with a deep valley extending obliquely inwards from the median portion of the inner wall and (PM 4, M 1-2) a shallow one extending from the posterior wall. Lower molars (PM 2, M 3) with two curved transverse crests.

#### RHINOCEROTIDAE. (XLVIII.)

bb. Neck more or less elongated. Incisor teeth developed in normal number (§). (*Rhinocerotoidae macraucheniformia*.)

\* Skull with the basioccipital widened forwards: with the nasal bones extremely reduced and above or behind the orbits: the supramaxillary bones rectilinear above, arched and approximating each other in front of the nasal aperture but separated by the extension upward of the vomer? Dental series almost

- continuous: upper posterior molars (M 2, 3) each with a shallow valley extending inwards from the anterior portion of the inner wall, and with two or three deep depressions in the inner half: lower molars (PM 3, M 3) with two (anterior and posterior) more or less defined crescent-shaped ridges: canines small.

**MACRAUCHENIIDAE. (XLIX.)**

- \*\* Skull with the basioccipital comparatively narrow forwards: with the nasal bones produced forwards and terminating in a free narrowed surface; the supra-maxillary bones with an upward developed expansion (connected with the nasal bones) and widely separated above in front. Dental series interrupted by wide diastemas: upper molars (PM 2, M 1, 2, 3) each with a deep valley extending obliquely inwards from the median portion of the inner wall and a shallow one extending from the angle or posterior wall: lower molars (PM 2, M 2) with two (anterior and posterior) crescent-shaped ridges: canines well developed.

**PALAEOTHERIIDAE. (L.)**

- b. Upper (as well as lower) true molars without a continuous outer wall, but (M 2-3, at least,) each with two complete transverse crests. (*Lophiodontoidea*.)

- 1. True molars as well as pre-molars in part (PM 2, 3, 4) nearly similar, squarish, and each with the anterior crest marginal, but with an anterior cingulum terminating in a cusp at the antero-outer angle of the tooth; hindmost molar (M 3) with no posterior lobe. Anterior feet with four toes; posterior with three, (in known types).

**TAPIRIDAE. (LI.)**

- 2. True molars and pre-molars differentiated from each other; the former oblong, with the anterior crest remote from the anterior margin and continuous with a small crest recurrent from the outer wall: hindmost molar with a posterior lobe; (pre-molars not bilophodont but with a lobe extending inwards from the inner wall). Anterior feet with four (?) toes; posterior with three (?).

**LOPHIODONTIDAE. (LII.)**

- B. Nasal region compressed and extended forwards, the supramaxillary bones excluded from the nasal aperture; the nasal bones elongated and extending far forwards, and articulated with the intermaxillary bones. Molars (M 1, 2, 3) of upper jaw each with two transverse rows of tubercles (3|3) separated by a transverse valley and with a cingulum anteriorly and internally: (lower molars dissimilar). (*Pliolophoidea*.)

**PLIOLOPHIDAE. (LIII.)**



*Perissodactyli? incertae sedis.*

Molar teeth of lower jaw with a crenulated longitudinal ridge. Canines and incisors wanting.

**ELASMOTHERIIDAE (LIV.)**

**SUPER-FAMILY ANCHIPPODONTOIDEA.**

**XLV a. ANCHIPPODONTIDAE.**

*Extinct.*

*Anchippodus* Leidy=*Trogosus* Leidy.

**SUPER-FAMILY SOLIDUNGULA.**

**XLVI. EQUIDAE.**

*Genera.*

*Equus* Linn.

*Asinus* Gray.

*Asinus sensu strict.*

*Hippotigris* H. Smith.

*Extinct.*

*Hipparion* Christol=*Hippotherium* Kaup.

*Merychippus* Leidy.

*Protophippus* Leidy=*Hippidion* Owen 1870.

**XLVII. ANCHITHERIIDAE.**

*Extinct.*

*Genera fide Leidy.*

*Anchitherium* v. Meyer=*Hipparitherium* Christol.

*Hypohippus* Leidy, 1858.

*Parahippus* Leidy, 1858.

*Anchippus* Leidy, 1868.

**SUPER-FAMILY RHINOCEROTOIDEA.**

**XLVIII. RHINOCEROTIDAE.**

*Genera.*

*Rhinaster* Gray.

*Rhinaster sensu strict.*

*Rhinoceros* Linn.

*Rhinoceros sensu strict.*

*Ceratotherium* Gray.

*Ceraterhinus* Gray.

*Extinct.*

§. 1.

*Coelodonta* Bronn.

§. 2.

*Acerotherium* Kaup.

*Badactherium* Croizet.

*Hyracodon* Leidy.

**XIX. MACRAUCHENIIDAE.***Extinct.**Macrauchenia* Owen=*Opisthorhinus* Bravard.**L. PALAEOOTHERIIDAE.***Extinct.**Palaotherium* Cuv.*Monacrum* Aymard.*Propalaotherium* Gervais, 1849.*Paloplotherium* Owen=*Plagiolophus* Pomel.**SUPER-FAMILY LOPHIODONTOIDEA.****LI. TAPIRIDAE.***Genera.*

§. 1.

*Elasmognathus* Gill.

§. 2.

*Tapirus* Linn.*Rhinochoerus* Gray.**LII. LOPHIODONTIDAE.***Extinct.**Genera fide* Bronn.*Lophiodon* Cuv.=*Tapirotherium* Blainv. 1817 (not 1846).*Tapiroporcus* Jäger, 1835.*Coryphodon* Owen, 1846.*Listriodon* v. Meyer, 1846=*Tapirotherium* Lartet*Pachynolophus* Pomel, 1847=*Hyracotherium* Blainv. 1844 (not Owen, 1840).*Lophiotherium* Gervais, 1849.*Tapirulus* Gervais, 1850.*Anchilophus* Gervais, 1852.**SUPER-FAMILY PLIOLOPHOIDEA.****LIII. PLIOLOPHIDAE.***Extinct**Pliolophus* Owen.**PERISSODACTYLI INCERTAE SEDIS.****LIV. ELASMOTHERIIDAE.***Extinct.**Elasmotherium* Fischer=? *Stereoceros* Duvernoy.**UNGULATA? INCERTAE SEDIS.***Hyracotherium* Owen.*Stereognathus* Owen.

## IV. TOXODONTIA.

### FAMILIES.

I. Teeth 44 ( $M \frac{3}{4}$ ,  $PM \frac{3}{4}$ ,  $C \frac{1}{4}$ ,  $I \frac{3}{4} \times 2$ ); molars of upper jaw mostly ( $PM \ 3-4$ ,  $M \ 1$ ) oblong, moderately narrowed backwards, with two folds (the anterior of which is divided) re-entering from the inner side. Incisors three on each side, with simple fangs; the first largest, compressed, widely separated from its homologue; the second smaller, trihedral; the third lateral and behind the second, and rudimentary: molars of lower jaw comparatively broad and complex: canines moderate; incisors implanted in a curved row.

### NESODONTIDAE. (LV.)

II. Teeth 36 ( $M \frac{3}{4}$ ,  $PM \frac{3}{4}$ ,  $C \frac{3}{4}$ ,  $I \frac{3}{4} \times 2$ ); molars with enamel coat interrupted at the anterior and posterior margins; those of upper jaw mostly ( $PM \ 3, 4$ ,  $M \ 1-3$ ) obliquely triangular, rapidly narrowed backwards, with a single simple fold re-entering obliquely forwards from the inner side. Incisors of upper jaw two on each side, but with incisorial crowns, the outer with roots of nearly uniform diameter throughout, and describing the segment of a circle, (like those of rodents,) and with persistent pulp—(Owen): molars of lower jaw narrowed, especially the posterior portions; canines rudimentary; incisors in a nearly straight line.

### TOXODONTIDAE. (LVI.)

### LV. NESODONTIDAE.

*Extinct.*

*Nesodon* Owen.

### LVI. TOXODONTIDAE.

*Extinct.*

*Toxodon* Owen

## V. HYRACOIDEA.

### FAMILY.

### LVII. HYRACIDAE.

*Genera.*

*Hyrax* Linn.

*Hyrax* Gray.

*Dendrohyrax* Gray.

*Euhyrax* Gray.

## IV. PROBOSCIDEA.

### FAMILIES.

I. Incisors of upper jaw ( $1+1$ ) everted, enormously developed and modified as cylindro-conic tusks, with roots extending backwards and converging,

and thus producing a high pre-narial rampart: incisors of lower jaw comparatively small and directed forwards, or entirely absent. Molars successively displacing each other from behind forwards (and therefore no pre-molars replacing the deciduous ones), and not more than two (or one) fully developed at the same time. Skull abbreviated and enlarged obliquely, convex backwards and outwards, and with the occipital condyles declined.

#### ELEPHANTIDÆ. (LVIII.)

II. Incisors of upper jaw atrophied or absent, (and consequently an uninterrupted oval depression occupying the naso-maxillary region): incisors of lower jaw (1+1) enlarged, and developed as tusks decurved downwards and backwards, and involving the symphyseal portion of the jaw. Molars vertically developed (with pre-molars replacing the deciduous molars), and in considerable number (PM  $\frac{1}{2}$ , M  $\frac{1}{2} \times 2$ ) at the same time. Skull moderately long, and with the occipital condyles inclined upwards.

#### DINOTHERIIDÆ. (LIX.)

### LVIII. ELEPHANTIDÆ.

#### SUB-FAMILIÆ.

I. Intermediate molars (D 4, M 1, 2) with an "isomorous" ridge formula (*i. e.* with the ridges equal in number in the successive teeth—three to five): the ridges atypically continuous: the valleys with a thick deposit of cementum.

#### ELEPHANTINÆ. (A.)

II. Intermediate molars (D 4, M 1, 2) with a "hypisomorous" or "anisomorous" ridge formula (*i. e.* with the ridges increasing in number by one ("hypisomorous") or more ("anisomorous") in the successive teeth (*e. g.* D 4<sup>1</sup>, M 1<sup>1</sup>, M 2<sup>2</sup> to D 4<sup>12</sup> pm, M 1<sup>12</sup> pm, M 2<sup>12</sup> pm): the ridges with more or less mammilliform tubercles: the valleys with little or no cementum.

#### MASTODONTINÆ. (B.)

#### A. ELEPHANTINÆ.

*Elephas* Linn.—*Elasmodon* Falc.—*Euelephas* Falc.

*Loxodonta* F. Cuv.—*Loxodon* Falc.

*Extinct genus.*

*Stegodon* Falc.

#### B. MASTODONTINÆ.

*Extinct.*

*Pentalophodon* Falc.

*Mustodon* Cuv.—*Tetralophodon* Falc.

*Tetracaulodon* Godman—*Trilophodon* Falc.

### LIX. DINOTHERIIDÆ.

*Extinct.*

*Dinotherium* Kaup.

## VII. SIRENIA.

### FAMILIES.

- I. Tail entire, rounded, and with the vertebrae towards last (i. e.  $5+x$ ); sub-cylindrical and destitute of transverse processes. Intermaxillary bones with the branches little prolonged backwards and with the anterior portion nearly or quite straight. (*Trichechoidea*.)

**TRICHECHIDAE. (LX.)**

- II. Tail forked, and with the vertebrae (except the terminal) depressed and provided with transverse processes. Intermaxillary bones (atypically) with the branches prolonged backwards and with the anterior portion more or less deflected. (*Halicoroidea*.)

A. Teeth present, and in part at least functionally developed in the adult: molars  $\frac{1}{2}$  to  $\frac{1}{2} \times 3$  in number, but rarely present in full complement, the anterior being gradually cast; incisors in the upper jaw two (more or less prominent) at least in the male. Teeth of the complete series—at least of Trichechidae—M  $\frac{1}{2}-\frac{1}{2}$ , C  $\frac{1}{2}$ , I  $\frac{1}{2} \times 2$ ; the upper incisors only persistent, the others as well as the canines being reabsorbed; molars successively increasing in size backwards.

1. Molars mostly with two or three roots each (generally three-rooted above and two-rooted below); and with crowns furnished with obtuse tubercles arranged in transverse yoke-like eminences, and in the posterior ones with an additional narrower tuberculated yoke behind the principal ones. (*Brandt*.)

**HALITHERIDAE. (LXI.)**

2. Molars with simple hollow roots (not separated from the crowns); with crowns furnished with little prominent tubercles, few in number (in the anterior teeth simple or double, in the rest three or four) not forming yoke-like eminences, and early worn away and disappearing.

**HALICORIDAE. (LXII.)**

- B. Teeth absent. (Intermaxillary lines with the apical portion produced and simulating incisorial teeth. Manducation is only effected by a very large palatine corneous plate, and by another opposed to it and covering the very large and elongated symphysis of the lower jaw.—*Brandt*.)

**RHYTINIDAE. (LXIII.)**

### SUPER-FAMILY TRICHECHOIDEA.

#### LX. TRICHECHIDAE.

##### Genus.

*Trichechus* Linn=*Manatus* Storr=*Oxystomus* Fischer.

above only as elongated hook-shaped borders produced backwards around the maxillaries. (*Delphinoidea*.)

1. Lachrymal bones coalesced with the jugals.

a. Costal cartilages not ossified. The tubercular and capitular articulations of the ribs blending together posteriorly. (Flower.)

a1. Maxillary bones with crests null or little developed. Teeth in great part with a complete cingulum, or a distinct tubercle at the base of the crown. Eye moderate. External respiratory aperture transversely crescentiform.

**INIIDAE. (LXVI.)**

a2. Maxillary bones with large bony incurved crests. Teeth without cingulum or tubercle. Eye rudimentary. External respiratory aperture longitudinal.

**PLATANISTIDAE. (LXVII.)**

b. Costal cartilages firmly ossified. Posterior ribs losing their capitular articulation, and only uniting with the transverse processes of the vertebræ by the tubercle. (Flower.)

**DELPHINIDAE. (LXVIII.)**

2. Lachrymal bones distinct from the jugals.

a. Costal cartilages not ossified. The hinder ribs losing their tubercular, and retaining their capitular articulation with the vertebræ. (Flower.)

**ZIPHIIDAE. (LXIX.)**

B. Head not rostrated or marginated; snout high towards the front and projecting beyond the mouth. Skull raised behind and retrorsely convex. Supraoccipital projecting forwards laterally to or beyond the vertical of the temporal fossæ. Frontals visible above as erect triangular or retrorsely falciform wedges between the maxillaries and supraoccipital. (*Physeteroidea*.)

**PHYSETERIDAE. (LXX.)**

II. Rostrum of skull prolonged into a slender, straight beak, the intermaxillary and maxillary bones forming a cylinder, bearing teeth on its proximal portion. (*Rhabdosteoidea*.)

**RHABDOSTEIDAE. (LXXI.)**

**SUPER-FAMILY DELPHINOIDEA.**

**LXVI. INIIDAE.**

*Genus.*

*Inia* D'Orb.

*Extinct Iniidae?*

*Tretosphys* Cope.

*Zarkachis* Cope.

*Priscodelphinus* Leidy.

*Ixacanthus* Cope.

*Lophocetus* Cope.

## LXVII. PLATANISTIDÆ.

Genus.

*Platanista* Cuv.

## LXVIII. DELPHINIDÆ.

## SUB-FAMILIÆ.

I. Neck evident externally, the cervical region being attenuated. Frontal area longitudinally expanded and little depressed. Postorbital process of frontal and zygomatic process of squamosal projecting outwards, and the latter enlarged and directed forwards. Maxillary with a crest and free margin over orbital region.

PONTOPORIINÆ. (A.)

II. Neck not evident externally, the cervical region not being differentiated. Frontal area abbreviated and declivous. Postorbital process of frontal and zygomatic process of squamosal compressed, and the latter comparatively short and oblique. Maxillary with no supraorbital crest.

1. Digits (second and third) not segmented into more than 5-6 phalanges, each.

a. Cervical vertebræ all distinct.

DELPHINAPTERINÆ. (B.)

b. Cervical vertebræ more or less (2 to 7) consolidated.

DELPHININÆ. (C.)

2. Digits (second and third) segmented into numerous phalanges.

GLOBIOCEPHALINÆ. (D.)

## A. PONTOPORIINÆ.

*Pontoporia* Gray=*Stenodelphis* Gerv.

## B. DELPHINAPTERINÆ.

*Delphinapterus* Lac., Lillj.=*Beluga* Gray.

*Monodon* Linn.

## C. DELPHININÆ.

*Sotalia* Gray.

*Steno* Gray.

*Delphinus* Linn.

*Clymenia* Gray.

*Turniops* Gerv.=*Turnio* Gray.

*Cephalorhynchus* F. Cuv.=*Eutropia* Gray.

*Lagenorhynchus* Gray.

*Electra* Gray.

*Feresa* Gray.

*Lucipleurus* Gray.

*Lagenorhynchus* Gray.

*Leucorhamphus* Lillj.=*Delphinapterus* Gray (not Lac.)

*Pseudorca* Reinh.

*Orca* Gray

*Ophysia* Gray.

*Orca sensu strict.*

*Orcella* Gray.

*Phocæna* Gray.

*Phocæna sensu strict.*

*Acanthodelphis* Gray.

*Neomeris* Gray.

*Sagmatias* Cope.

## D. GLOBIOCEPHALINAE.

*Globiocephalus* Gray.*Globiocephalus* sensu strict.*Grampus* Gray.*Sphaerocephalus* Gray.

## LXIX. ZIPHIIDAE.

## SUB-FAMILIES.

I. Maxillaries with no incurved lateral crests.

ZIPHIINAE. (A.)

II. Maxillaries with greatly developed incurved crests.

ANARNACINAE. (B.)

## A. ZIPHIINAE.

*Ziphius* Cuv. = *Epiodon* Gray.*Epiodon* Gray.*Petroryhnchus* Gray.*Mesoplodon* Gerv. = *Ziphius* Gray = *Heterodon* Blainv. 1816 (not Beauv. 1800) = *Diodon* Less. = *Aodon* Less. = *Nodus* Wagl.*Ziphius* Gray.*Dolichodon* Gray.*Neoziphius* Gray.*Dioplodon* Gerv.*Berardius* Duv.

## B. ANARNACINAE.

*Anarnacus* Lac. = *Hyperoodon* Lac. = *Chenocetus* Eschr.*Hyperoodon* Gray.*Lagenocetus* Gray.Extinct *Ziphiidae*.*Choneziphius* Duv.*Belemnziphius* Huxl.*Placoziphius* Van Ben.*Ziphirostrum* Van Ben.*Aporotus* Du Bus.*Ziphiopsis* Du Bus.*Rhinostodes* Du Bus.

## SUPER-FAMILY PHYSETEROIDEA.

## LXX. PHYSETERIDAE.

## SUB-FAMILIES.

I. Head very large, truncated in front. Blow-hole near the edge of the snout. Cerebral cavity declining downwards. Jugal and zygomatic processes of squamosal connected.

PHYSETERINAE. (A.)

II. Head moderate, conic in front. Blow-hole frontal. Cerebral cavity inclining upwards. Jugal and zygomatic processes of squamosal remote.

KOGIINAE. (B.)

## A. PHYSETERINAE.

*Physeter* Linn. = *Catodon* Gray + *Physeter* Gray.*Physeter* sensu strict.*Meganeuron* Gray.

## B. KOGIINAE.

*Kogia* Gray = *Euphysetes* Wall.*Callignathus* Gill.



*Extinct Physeteridae?**Orycterocetus* Leidy.*Ontocetus* Leidy.**SUPER-FAMILY? RHARDOSTEOIDEA.****LXXI. RHARDOSTEIDAE.***Extinct genus.**Rhabdosteus* Cope.**MYSTICETE.**

I. Skull with the maxillary region slightly arched, and with short baleen plates. Rostrum broad at the base, gradually tapering, depressed. Frontals with the orbital processes moderately prolonged, broad, and flat on the upper surface. (Supramaxillary bones with the posterior margin deeply excavated.) Tympanic bones elongated, ovoid. Lower jaw with the coronoid process more or less developed. Cervical vertebræ in whole or in part separated. Manus narrow, with four digits (first wanting). (Flower.)

**BALAENOPTERIDAE. (LXXII.)**

II. Skull with the maxillary region greatly arched, and with long, narrow baleen plates. Rostrum narrow and compressed at the base. Frontals with the orbital processes much prolonged, and extremely narrow and rounded on the upper surface. (Supramaxillary bones with the posterior margins entire.) Tympanic bones broad, rhomboid. Lower jaw with the coronoid processes scarcely perceptible. Cervical vertebræ coalesced. Manus broad, with five digits. (Flower.)

**BALAENIDAE. (LXXIII.)****LXXII. BALAENOPTERIDAE****SUB-FAMILIES.**

I. Throat not plicated. Dorsal fin null.

**AGAPHELINAE. (A.)**

II. Throat longitudinally plicated. Dorsal fin developed.

A. Frontal with the orbital processes much narrowed externally. (Flower.) Manus very long, with the four digits segmented into many phalanges. Dorsal fin hump-like.

**MEGAPTERINAE. (B.)**

B. Frontal processes with the orbital processes nearly as broad at the outer extremity as the base, or somewhat narrowed. (Flower.) Manus moderate, with the four digits having each not more than six phalanges. Dorsal fin high, erect, falcate or subfalcate.

**BALAENOPTERINAE. (C.)****A. AGAPHELINAE***Agaphelus* Cope.*Rhachianectes* Cope.

February, 1872.

**M. MEGAPTERINAE.**

*Megaptera* Gray.  
*Poescopia* Gray.  
*Eschrichtius* Gray.

**C. BALAENOPTERINAE.**

## §. 1.

*Physalus* Gray.  
*Benedenia* Gray. *Physalus* Gray.  
*Cuvierius* Gray.  
*Sibbaldius* Gray, 1866=*Flowerius* Lillj. 1867.  
*Rudolphius* Gray (*s. g.*), 1866=*Sibbaldius* Lillj. 1867.

## §. 2.

*Balaenoptera* Lac.  
*Balaenoptera sensu strict.* *Swinhoia* Gray.

*Extinct genera incertae sedis.*

*Cetotherium* Brandt.  
*Plesiocetus* Van Ben and Gerv.

**LXXIII. BALAENIDAE.***Genera.*

(*Fide* Gray.)

*Balaena* Linn.  
*Neobalaena* Gray.  
*Eubalaena* Gray.  
*Hunterius* Gray.  
*Caperea* Gray.  
*Macleayius* Gray.

*Extinct Balaenidae?*

*Palaeocetus* Seeley.

SMITHSONIAN MISCELLANEOUS COLLECTIONS.

247

ARRANGEMENT  
OF THE  
FAMILIES OF FISHES,  
OR  
CLASSES PISCES, MARSIPOBRANCHII, AND  
LEPTOCARDII.

PREPARED FOR THE SMITHSONIAN INSTITUTION

BY

THEODORE GILL, M.D., Ph.D.



WASHINGTON:  
PUBLISHED BY THE SMITHSONIAN INSTITUTION.  
NOVEMBER, 1872.



## ADVERTISEMENT.

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THE following list of families of Fishes has been prepared by Dr. THEODORE GILL, at the request of the Smithsonian Institution, to serve as a basis for the arrangement of the collection of Fishes of the National Museum; and, as frequent applications for such a list have been received by the Institution, it has been thought advisable to publish it for more extended use. In provisionally adopting this system for the purpose mentioned, the Institution is not to be considered as committed to it, nor as accountable for any of the hypothetical views upon which it may be based.

JOSEPH HENRY,  
*Secretary, S. I.*

SMITHSONIAN INSTITUTION,  
WASHINGTON, October, 1872.



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# INTRODUCTION.

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## OBJECTS.

A LIST of the families of fishes having long been urgently needed for the re-arrangement of the extensive collections of those animals in the Smithsonian Institution, the following has been drawn up. The author has long delayed its publication in order to continue his investigations and extend them into some more of the many doubtful questions that still involve ichthyology, but as such considerations would cause an indefinite postponement of publication, and as the list itself is desirable as a starting-point for renewed investigation, and is, of course, more available in a printed form than in manuscript, it is now printed; being printed, its publication has been deemed advisable as it may supply to others the want that has been experienced by the Smithsonian Institution. That it will stand the test of time as to many details is not to be expected.

## STATUS OF ICHTHYOLOGY.

Studies in ichthyology have, for the most part, been directed to the external organization, and the characters of all but the highest groups have been chiefly derived from features visible from the exterior, and modifications of single organs whose co-ordinations with other modifications, and consequently taxonomic values, have not been verified. If a system among fishes thus established has proved to be more true to nature than analogous ones would be among the mammals, birds, or reptiles, it is because so many of the elements of the skeleton, such as the jaws, opercular bones, suborbitals, scapulars, branchiostegal bones, and rays are more or less exposed to view, and the modifications more or less noted, or, when concealed, the contrast taken cognizance of. A classification based on superficial features in the fishes is thus, to a considerable degree, the expression of skeletal modifications, which are themselves the co-ordinates, as experience has shown, of others. For though the characters derived there-

proximating them, while, on the other hand, Dr. Günther<sup>1</sup> has contended for the union of the Ganoids, Dipnoans, and Elasmobranchiates into one subclass, for which he has proposed the name *PALAEICHTHYES*.

—— Om Ganoidernes Begrænsning og Inddeling, . . . . < Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjöbenhavn, for Aaret 1868, 1869, pp. 1-82.

—— On the limits and classification of the Ganoids. . . . . < Annals and Magazine of Natural History, (London), 4th series, v. 7, 1871, pp. 329-339.

Dr. Lütken attaches primary importance to (1) the freedom or attachment of the gills, and (2) the communication of the air bladder with the intestinal canal or exclusion therefrom.

He subordinates the subdivisions as follows :—

Subclass A. *TELEOSTEI* s. *ELEUTEROBRANCHII*.

Order 1. *Physoclisti* s. *Acanthopteri*.

Order 2. *Physostomi* s. *Malacopteri*.

Suborder a. *Typici* (including *Cyologanoidei*).

Suborder b. *Ganoidei*.

Suborder c. *Sturiones*.

Suborder d. *Protopteri*.

Subclass B. *CHONDROSTEI* s. *DESMOBRANCHII*.

Order 3. *Selachii*.

Order 4. *Cyclostomi*.

Order 5. *Branchiostomi*.

*Incertae sedis*.

Order 6. *Placodermi*.

The above subclass *Teleostei* is equivalent to the order *Branchiata* of Pallas, and the subclass *Telostomi* of Owen; the subclass *Chondrostei*, to the class *Ichthyodera* of Geoffroy St. Hilaire, the order *Spiraculata* of Pallas, and the order *Placoidi* of Agassiz.

\* COPE (Edward Drinker). Observations on the Systematic relations of the Fishes, . . . . < The American Naturalist (Salem), v. 5, 1871, pp. 579-593; also, (somewhat modified) < Proceedings of the American Association for the Advancement of Science, 1871 (1872), pp. 317-343.

Prof. Cope's primary divisions or subclasses of the class *PISCES* are as follows :—

Subclass *HOLOCEPHALI*.

Subclass *SELACHII*.

Subclass *DIPNOI*.

Subclass *CROSSOPTERYGIA*.

Subclass *ACTINOPTERI*.

Tribe *Chondrostei*.

Tribe *Physostomi*.

Order *Ginglymodi* (*Lepidosteidae*).

Order *Halecomorphi* (*Amiidae*).

The succeeding orders of *Physostomi* and the *Physoclysti* are all *Teleosteans* of Müller.

<sup>1</sup> Günther (Albert C. L. G.). The new Ganoid fish (*Ceratodus*) recently discovered in Queensland. < Nature, (London,) v. 4, 1871, pp. 406-408, 423-429, (447).

The author, after a careful review of the subject, is compelled to agree with Messrs. Kner, Owen, Lütken, and Cope in the closer combination of the Teleosts, Ganoids, and Dipnoans and the contradistinction of the united group from the Elasmobranchiates, and is even disposed to admit that the range of variation in the Ganoid series is so great that less difference appears to exist between the most teleosteoid Ganoids (e. g., *Amia*) and the Teleosteans than between them and the most generalized Ganoids (e. g., *Polypterus* and *Acipenser*). But, notwithstanding this, the establishment by Johannes Müller of the subclass for which he adopted the name Ganoidei appears to have been one of the most important in the history of Ichthyology, as it was the expression of the discovery of characters which undoubtedly indicate affinity, and, however much recent Ichthyologists have dissented from him as to the boundaries of groups, all have left the Ganoids in immediate juxtaposition to each other, and have chiefly differed from him as to the point where the primary division should be established, whether on one side or other of the Müllerian Ganoids.

In the following list of families, the three subclasses of true fishes established by Müller are still retained, but are combined under two series, TELEOSTOMI (Owen) and ELASMOBRANCHII (Bon., Müll.), and the several superorders are distinguished among the Ganoids. For while the author is prepared to admit that the extremes of the Ganoids are more dissimilar than one of those extremes and the typical physostome Teleosts, it is not yet apparent that the relations between the Ganoids and Teleosts are as intimate as those between the contiguous orders of the latter series.

#### ORDERS OF FISHES.

After a recent review of the various proposals for the modification of the system by various authors, and due examination of the animals themselves, the author is compelled to retain the orders of Teleosts adopted in the classification proposed by him in 1861, suppressing, however, the (then

—— Description of *Ceratodus*, a genus of Ganoid Fishes, recently discovered in rivers of Queensland, Australia. . . . < Philosophical Transactions of the Royal Society of London, v. 161, 1872, pp. 511-571, pl. 30-42.

Dr. Günther recognizes only two orders among Palæichthyes, viz:—

Fourth subclass: PALÆICHTHYES.

Order 1. *Chondropterygii*.

Suborder 1. *Plagiostoma*.

Suborder 2. *Holocephala*.

Order 2. *Ganoidei*.

Suborder 1. *Amlioidei*.

Suborder 2. *Lepidosteoides*.

Suborder 3. *Polypteroides*.

Suborder 4. *Chondrostes*.

Suborder 5. *Dipnoi*.

so stated) provisional order Lemniscati (which, as he subsequently urged,<sup>1</sup> was a heterogeneous group based upon the larvae of other fishes but primarily those of *Muraenidae*), and adopting among the Teleost series the orders OPISTHOMI, HEMIBRANCHII, and SCYPHOPHORI (Cope), the last of which was subsequently approximated by the author<sup>2</sup> to the NEMATOGNATHI, a view since confirmed by Prof. Cope.

All the orders thus adopted, so far as considerable material indicate, appear to be well distinguished by peculiarities of the skeleton and the nervous system. The peculiarities of the skeleton are expressed in the skull, (1) especially in the varying combinations of the elements which compose the cranial box, as well as (2) the palato-pterygoid system, and (3) the suspensorium of the lower jaw, while in (4) the modifications of the shoulder girdle, other excellent characters are found. These are to a greater or less extent co-ordinated with and confirmed by (5) the development of the brain, especially the internal structure of the optic lobes and the relations of the various parts. These characters certainly seem to be of more importance than the development of some of the bones that sustain the fins as (*pro*) rays or as (*con*) spines, and as there is no co-ordination between the latter developments and other modifications of structure, the groups so distinguished must be admitted to have a very unsatisfactory basis. And surely it is rather illogical to urge that other characters are of little importance because they do not coincide with the structure of the fin-rays, for the question at issue is taken for granted. But so wedded

<sup>1</sup> GILL (Theodore Nicholas). On the Affinities of several doubtful British Fishes, . . . . <Proceedings of the Academy of Natural Sciences of Philadelphia, 1864, pp. 207-208; reprinted (in part). <Annals and Magazine of Natural History, 3d series, v. 15, 1864, p. 4.

Dr. Günther subsequently endorsed these views in general (v. 8, p. 137), but having mistaken the tenor of the remarks of the author, has afterwards stated, in respect to *Stomiasunculus*, that he "cannot agree with Mr. Gill, who compares this fish to a larval Clupeoid" (v. 8, p. 145). It will be evident, however, on reperusal, that I by no means meant to suggest that *Stomiasunculus* had any affinity with Clupeoids, the statement being that "*Stomiasunculus* resembles, in general features, a less advanced [than *Esunculus*] Clupeoid, about three days old, in which the ventral fins have not yet appeared." The comparison of the form in question with the larval Clupeoid was evidently simply to verify the probability of the immature condition of *Stomiasunculus*, but the true affinities were sought for elsewhere. It was added, "suspicion, however, may be entertained that it may, perhaps, be the young of some other type (possibly *Stomiatoideis*), on account of the backward position of the dorsal fin." Such is also the opinion of Dr. Günther himself, who remarks that "this is evidently the young of *Stomias* or of a fish very closely allied to it." More than this, the evidence would not authorize.

<sup>2</sup> GILL (Theodore Nicholas). Synopsis of the Fishes of the Gulf of St. Lawrence and Bay of Fundy, . . . . <The Canadian Naturalist and Geologist (Montreal), 2d series, v. 2, 1864, p. 262.

is the mind generally to impressions early received or which have become current, that insensibly the premises in dispute are assumed and results viewed with preconceptions reflected from the assumed premises.

But at the same time, caution must be exercised lest too great importance is attached to the minor modifications. For example, the great frontal bone in the Gadinae and near related subfamilies is single, as in many other fishes, but in the subfamily Lotinae and in the family Merlucciidae, two entirely separate bones exist instead. Again, the inferior pharyngeal bones are generally distinct in the Teleocephali, but in several families they are united more or less early, and, in the extreme forms, very soon, losing all trace of suture, and the eminent Johannes Müller was led to separate the forms so distinguished from other fishes as a distinct order (Pharyngognathi); that such a combination, however, was somewhat hasty is demonstrable, independently of hypothetical considerations as to the values of characters by certain facts. First, the combination thus formed was a heterogeneous one, definable by no other internal or external common characters, and composed of forms which respectively agreed in structure, in all other respects, in the closest manner with other widely separated types, and thus the character became tainted with suspicion. Second, in another form (*Haploidonotus*) agreeing (generically) in almost all details—and very characteristic ones moreover—with forms (Sciaenidae) possessed generally of entirely separated bones, the pharyngeal bones were found united as entirely as, and even more so than, in typical Pharyngognathi of Müller, and it thus became evident that *per se* a combination based on such a character would violently divorce forms from their natural allies, and it was equally evident that the character itself was one liable to recur in very dissimilar groups, and not even having the advantage of being a technical expression of a natural group.

With these remarks, examination may be made of the various orders of fishes that have been adopted, commencing with those forms that appear to be the most generalized or least removed from the Ganoids: the sequence herein adopted is the most convenient for present purposes, and is also believed to be a tolerably close exponent of nature.

But as it will be necessary to make use of some elements concerning which much difference of opinion prevails among anatomists, the author deems it advisable to digress in order to examine into the merits of the questions in dispute, and present his reasons for the nomenclature subsequently adopted.

#### EXCURSUS ON THE SHOULDER GIRDLE OF FISHES.

Few problems involving the homologies of bones in the vertebrate branch have been in so unsatisfactory a condition as that respecting the

shoulder girdle and its constituents in fishes. But the recent observations of Bruhl, Gegenbaur, and Parker have thrown a flood of light upon the subject. Some minor questions, however, appear still to be unsettled; the writer, at least, has not been able to convince himself of the correctness of all the identifications, and of the names conferred as expressions thereof. Recent study has increased such doubts respecting the applicability of former nomenclatures, and has led to conclusions different from those announced by previous investigators.

The following are assumed as premises that will be granted by all zootomists :—

1. Homologies of parts are best determinable, *cæteris paribus*,<sup>1</sup> in the most nearly related forms.

2. Identifications should proceed from a central or determinate point outwards.

The applications of these principles are embodied in the following conclusions :—

1. The forms that are best comparable and that are most nearly related to each other, are the Dipnoi, an order of fishes at present represented by *Lepidosiren*, *Protopterus*, and *Ceratodus*, and the Batrachians as represented by the Ganocephala, Salamanders, and Salamander-like animals.

2. The articulation of the anterior member with the shoulder girdle forms the most obvious and determinable point for comparison in the representatives of the respective classes.

#### THE GIRDLE IN DIPNOANS.

##### I.

The proximal element of the anterior limb in the Dipnoi has, almost by common consent, been regarded as homologous with the HUMERUS of the higher vertebrates.

##### II.

The humerus in the Urodele Batrachians, as well as the extinct Ganocephala and Labyrinthodontia, is articulated chiefly with the coracoid.

Therefore, the element of the shoulder girdle with which the humerus of the Dipnoi is articulated, must also be regarded as the CORACOID (subject to the proviso hereinafter stated), unless some specific evidence can be shown to the contrary. No such evidence has been produced.

##### III.

The scapula in the Urodele and other Batrachians is entirely or almost wholly excluded from the glenoid foramen, and above the coracoid.

Therefore, the corresponding element in Dipnoi must be the SCAPULA.

<sup>1</sup> Parts affected by teleological modifications may be excepted.

IV.

The other elements must be determined by their relation to the preceding, or to those parts from or in connection with which they originate.

All those elements in *immediate* connection<sup>1</sup> with the pectoral fin and the scapula must be homologous as a whole with the coraco-scapular plate of the Batrachians,—that is, it is infinitely more probable that they represent as a whole or as dismemberments therefrom the coraco-scapular element than that they have independently originated.

But the homogeneity of that coraco-scapular element forbids the identification of the several elements of the Fishes' shoulder girdle with regions of the Batrachian's coraco-scapular plate.

And it is equally impossible to identify the fishes' elements with those of the higher reptiles or other vertebrates which have developed from the Batrachians. The elements in the shoulder girdles of the distantly separated classes *may* be (to use the terms introduced by Dr. Lankester) homoplastic, but they *are not* homogenetic.

Therefore, they must be named accordingly.

The element of the Dipnoan's shoulder girdle, continuous downwards from the scapula, and to which the coracoid is closely applied, may be named **ECROCORACOID**.

V.

Neither the scapula in Batrachians nor the cartilaginous extension thereof, designated Suprascapula, is dissevered from the coracoid.

Therefore, there is an *a priori* improbability against the homology with the scapula of any part having a distant or merely ligamentous connection with the humerus-bearing element.

Consequently, as an element better representing the scapula exists, the element named scapula (by Owen, Günther, etc.) cannot be the homologue of the scapula of Batrachians.

On the other hand, its more intimate relations with the skull and the mode of development indicate that it is rather an element originating and developed in more intimate connection with the skull.

It may therefore be considered, with Parker, as a **POSTTEMPORAL**.

VI.

The shoulder girdle in the Dipnoi is connected by an **azygous** differentiated cartilage, swollen backwards.

It is more probable that this is the homologue of the **STERNUM** of Batrachians, and that in the latter, that element has been still more differentiated and specialized than that it should have originated *de novo* from an independently developed nucleus.

<sup>1</sup> The so scapula and suprascapula of most authors are excluded from this connection.

The homologies of the elements of the shoulder girdle of the Dipnoi appear then to be as follows:—

Nomenclature Adopted.	Owen.	Parker.	Günther.
HUMERUS.	Humerus.	Humerus.	Forearm.
CORACOID (OR PARAGLENAL). <sup>1</sup>	} Coracoid.	Scapula.	Humeral cartilage.
SCAPULA.		Supraclavicle.	} Coracoid. <sup>4</sup>
ECTOCORACOID (OR CORACOID). <sup>2</sup>		Clavicle.	
STERNUM. <sup>3</sup>		Epicoracoid.	Median cartilage.
POSTTEMPORAL.	Scapula.	Posttemporal.	Suprascapula.

#### THE GIRDLE IN OTHER FISHES.

Proceeding from the basis now obtained, a comparative examination of other types of Fishes successively removed by their affinities from the Lepidosirenids may be instituted.

##### I.

With the humerus of the Dipnoans, the element in the Polypterids (single at the base but immediately divaricating, and with its limbs bordering an intervening cartilage which supports the pectoral and its basilar ossicles) must be homologous.

But it is evident that the external elements of the so-called carpus of teleosteid Ganoids are homologous with that element in Polypterids.

Therefore, those elements cannot be carpal, but must represent the humerus.

<sup>1</sup> Gelenkstelle der Brustflosse am primären Schulterknorpel.—Gegenbaur.

<sup>2</sup> Clavicula.—Gegenbaur.

<sup>3</sup> Verbindungsstelle des beiderseitigen Schulterknorpels.—Gegenbaur.

Prof. Gegenbaur regards the median cartilage as a dismemberment of a common cartilage, the upper division of which receives the pectoral limb, while the lower unites with the corresponding dismemberment of the opposite side and forms the median cartilage.

<sup>4</sup> The suture separating the "coracoid" into two portions has been observed by Dr. Günther, but he could "not attach much importance to this division."



## II.

The element with which the homologue of the humerus, in Polypterids, is articulated must be homologous with the analogous element in Dipnoans, and therefore with the CORACOID.

The Coracoid of Polypterids is also evidently homologous with the corresponding element in the other Ganoids, and the latter consequently must be also CORACOID.

It is equally evident, after a detailed comparison, that the single Coracoid element of the Ganoids represents the three elements developed in the generalized Teleosts (Cyprinids, etc.) in connection with the basis of the pectoral fin, and such being the case, the nomenclature should correspond. Therefore, the upper element may be named HYPERCORACOID; the lower, HYPOCORACOID; and the transverse or median, MESOCORACOID.

## III—IV.

(PROSCAPULA, or united SCAPULA and ECTOCORACOID.)

The two elements of the arch named by Parker, in *Lepidosiren*, "supraclavicle" (= scapula), and "clavicle" (= ectocoracoid) seem to be comparable together, and as a whole with the single element carrying the humerus and pectoral fin in the Crossopterygians (*Polypterus* and *Calamoichthys*) and other fishes,<sup>1</sup> and therefore not identical respectively with the "supraclavicle" and "clavicle" (except in part) recognized by him in other fishes.

As this compound bone, composed of the scapula and ectocoracoid fused together, has received no name which is not ambiguous or deceptive in its homological allusions, it may be designated as PROSCAPULA.

## V.

The posttemporal of the Dipnoans is evidently represented by the analogous element in the Ganoids generally, as well as in the typical fishes.

The succeeding elements (outside those already alluded to) appear from their relations to be developed from or in connection with the posttemporal, and not from the true scapular apparatus; they may therefore be named POSTTEMPORAL, POSTEROTEMPORAL, and TELEOTEMPORALS.

<sup>1</sup> Dr. Günther (Phil. Trans., v. 161, p. 531) has observed, respecting the division in question in *Lepidosiren* and *Ceratodus*: "I cannot attach much value to this division; the upper piece is certainly not homologous with the scapula of Teleostean fishes, which is far removed from the region of the pectoral condyle."

The homologies of the elements of the girdle of Dipnoans with those of other fishes, and the added elements in the latter will be as follows :—

	Cuvier.	Owen.	Gegenbaur.	Parker.
ACTINOSTS.	Os du carpe.	Carpal.	Basalstücke der Brustflüsse.	Erachial.
CORACOID OF PARAGLENAL.	Simple in Dipnoi and Ganoidei			
HYPERCORACOID.	Radial.	Ulna.	Oberes Stück (Scapulare).	Scapula.
MESOCORACOID.	Troisième os de l'avant bras qui porte l'nageoire pectorale.	Humerus.	Spangenstein.	Precoracoid.
HYPOCORACOID.	Cubital.	Radius.	Vorderes Stück (Procoracoid).	Coracoid.
PROSCAPULA. <sup>1</sup>	Huméral.	Coracoid.	Clavicula.	Clavicle.
SCAPULA. ECTOCORACOID.	} Differentiated only in Dipnoi.			
STERNUM.	Differentiated in Dipnoi.			
POSTTEMPORAL ELEMENTS.				
POSTTEMPORAL.	Suprascapulaire.	Suprascapula.	Supraclaviculare (a).	Posttemporal.
POSTEROTEMPORAL.	Scapulaire.	Scapula.	Supraclaviculare (b).	Supraclavicle.
TELEOTEMPORALS.	Os coracoidien.	Clavicle.	Accessorisches Stück.	Postclavicles.

It will be thus seen that the determinations here adopted depend mainly (1) on the interpretation of the homologies of the elements with which the pectoral limbs are articulated, and (2) on the application of the term "coracoid." The name "coracoid," originally applied to the process so called in the human scapula, and subsequently extended to the independent element homologous with it in birds and other vertebrates, has been more especially retained (*e. g.*, by Parker in Mammals, etc.) for the region including the glenoid cavity. On the assumption that this may be preferred by most zootomists, the preceding terms have been applied. But, if the name should be restricted to the proximal element, nearest the glenoid cavity, in which ossification commences, the name PARAGLENAL given by

<sup>1</sup> The name scapula might have been retained for this element as it is (if the views here maintained are correct) homologous with the entire scapula of man, less the coracoid and glenoid elements, but the restricted meaning has been so universally adopted that it would be inexpedient now to extend the word.

Duges to the cartilaginous glenoid region can be adopted, and the coracoid would then be represented (in part), rather by the element so named by Owen. That eminent anatomist, however, reached his conclusion (only in part the same as that here adopted) by an entirely different course of reasoning, and by a process, as it may be called, of elimination; that is, recognizing first the so-called "radius" and "ulna," the "humerus," the "scapula," and the "coracoid" were successively identified from their relations to the elements thus determined, and because they were numerically similar to the homonymous parts in higher vertebrates.

The detailed arguments for these conclusions, and references to the views of other authors, will be given in a future memoir. I will only add here that these homologies seem to be fully sustained by the relations of the parts in the generalized Ganocephalous Batrachians (*Apateon* or *Archegosaurus*, etc.).

### CHARACTERISTICS AND SEQUENCE OF PRIMARY GROUPS.

Returning now to the consideration of the primary classification of Fishes, the results are submitted, in brief, of inquiries thus far instituted into the limits, characters, and relations of the orders and including groups.

While among the Mammals, there is *almost*<sup>1</sup> universal concurrence as to the forms entitled to the first as well as the last places, naturalists differ much concerning the "highest" of the ichthyoid vertebrates, but are all of one accord respecting the form to be designated as the "lowest." With that admitted lowest form as a starting-point, inquiry may be made respecting the forms which are successively *most nearly related*.

#### LEPTOCARDIANS.

No dissent has ever been expressed from the proposition that the Leptocardians (*Branchiostoma*) are the lowest of the Vertebrates; while they have doubtless deviated much from the representatives of the immediate line of descent of the higher vertebrates, and are probably specialized considerably, in some respects, in comparison with those vertebrates from which they (in common with the higher forms) have descended, they undoubtedly have diverged far less, and furnish a better hint as to the proto-vertebrates than any other form.

#### MARSIPOBRANCHIATES.

Equally undisputed is it that most nearly related to the Leptocardians

<sup>1</sup> One eminent authority appears to think that the Cetaceans are the lowest and most differentiated of Mammals, and, as a matter of fact, no one, it is presumed, would dispute the proposition that the differences are more obvious, but they are *teleological*, and not *morphological*; therefore, and in view of the gradation between them and normal quadrupeds furnished by extinct types, naturalists are almost agreed in denying the characters in question a taxonomic value equal to that accorded to the differences exhibited by the Monotremes.

are the Marsipobranchiates (*Lampreys*, etc.), and the tendency has been rather to overlook the fundamental differences between the two, and to approximate them too closely, than the reverse.

#### PISCES.

But here unanimity ends, and much difference of opinion has prevailed with respect to the succession in the system of the several sub-classes (by whatever name called) of true Fishes, (1) some (*e. g.* Cuvier, J. Müller, Owen, Lütken, Cope) arranging next to the lowest, the Elasmobranchiates and, as successive forms, the Ganoids and Teleosteans, (2) while others (*e. g.* Agassiz, Dana, Duméril, Günther) adopt the sequence Leptocardians, Marsipobranchiates, Teleosteans, Ganoids, and Elasmobranchiates. The source of this difference of opinion is evident, and results partly from metaphysical or psychological considerations, and partly from those based (in the case of the Ganoids) on real similarities and affinities.

#### ELASMOBRANCHIATES.

The evidence in favor of the title of the Elasmobranchiates to the "highest" rank is based upon, (1) the superior development of the brain; (2) the development of the egg, and the ovulation; (3) the possession of a placenta; and (4) the complexity of the organs of generation.

(1) It has not been definitely stated wherein the superior development of the brain consists, and as it is not evident to the author, the vague claim can only be met by this simple statement: it may be added, however, that the brains comparable in essentials and most similar as a whole to those of the Marsipobranchiates, are those of the Sharks. In answer to the statement that the Sharks exhibit superior intelligence, and thus confirm the indications of cerebral structure, it may be replied that the impression is a subjective one, and the author has not been thus influenced by his own observations of their habits. Psychological manifestations, at any rate, furnish too vague criteria to be available in exact taxonomy.

(2) If the development of the eggs, their small number, and their investment in cases, are arguments in favor of the high rank of the Elasmobranchiates, they are also for the Marsipobranchiates, and thus prove too much—or too little—for the advocates of the view discussed. The variation in number of progeny among true Fishes (*e. g.*, *Cyprinodonts*, *Embiotocids*) also demonstrates the unreliability of those modifications *per se*.

(3) The so-called placenta of some Elasmobranchiates may be *analogous* to that of Mammals, but that it is not *homologous* (*i. e.*, homogenetic) is demonstrable from the fact that all the forms intervening between them and the specialized placental mammals are devoid of a placenta, and by the variation (presence or want) among the Elasmobranchiates themselves.

(4) The organs of generation in the Elasmobranchiates are certainly

more complex than in most other Fishes, but as the complexity results from specialization of parts *sui generis*, and different from those of the higher (quadruped) vertebrates, it is not evident what bearing the argument has. If it is claimed simply on the ground of specialization, irrespective of homological agreement with admitted higher forms, then are we equally entitled to claim any specialization of parts as evidence of high rank, or at least we have not been told within what limits we should be confined. The Cetaceans, for example, are excessively specialized Mammals, and, on similar grounds, would rank above the other Mammals and Man; the Aye-aye exhibits in its dentition excessive specialization and deviation from the primitive type (as exhibited in its own milk teeth) of the Primates, and should thus also rank above Man. It is true that in other respects the higher Primates (even excluding man) may be more specialized, but the specialization is not as obvious as in the cases referred to, and it is not evident how we are to balance *irrelative* specializations against each other, or even how we shall subordinate such cases.<sup>1</sup> We are thus compelled by the *reductio ad absurdum* to the confession that *irrelative* specialization of single organs is untrustworthy, and are fain to return to that better method of testing affinities by the equation of agreement in whole, and after the elimination of special teleological modifications.

The question then recurs, What forms are the most *nearly allied* to the Marsipobranchiates, and what show the closest approach in *characteristic* features. And in response thereto, the evidence is not undecisive. Wide as is the gap between Marsipobranchiates and Fishes, and comparatively limited as is the range of the latter among themselves, the Elasmobranchiates are very appreciably more like, and share more characters in common with them, than any other; so much is this the case, that some eminent naturalists (*e. g.* Pallas, Geoffroy St.-Hilaire, Latreille, Agassiz (formerly), Lütken) have combined the two forms in a peculiar group, contradistinguished from the other fishes. The most earnest and extended argument, in English, in favor of this combination, has been published by Prof. Agassiz, in his "Lake Superior,"<sup>2</sup> but that eminent naturalist subsequently arrived at the opposite conclusions already indicated.

The evidences of the closer affinity of the Elasmobranchiates (than of any other Fishes) with the Marsipobranchiates, are furnished by (1) the cartilaginous condition of the skeleton; (2) the post-cephalic position of the branchiæ; (3) the development of the branchiæ, and their restriction to special chambers; (4) the larger number of branchiæ; (5) the imperfect develop-

<sup>1</sup> It will recur to the reader that in the case referred to, the question is really as to the *degree* of specialization.

<sup>2</sup> Agassiz (Louis). *Lake Superior: its Physical Character, Vegetation, and Animals*, 1859, pp. 249-252.

ment of the skull; (6) the mode of attachment of the teeth; (7) the slight degree of specialization of the rays of the fins; and (8) the rudimentary condition of the shoulder-girdle.

In none of these cases is there exact, or even very close similarity, for, as already remarked, the gap between the Fishes (and the Elasmobranchiates as the most generalized form) and the Marsipobranchiates is extremely wide. In each case, however, the generalized or rudimentary condition of the organs points to the still more generalized, rudimentary, or undeveloped conditions exhibited by the Marsipobranchiates. The testimony of these parts is also concurrent, is reinforced by other resemblances, less obvious but valuable as accumulative, and is not offset by the evidence of other parts (unless *irrelative* specialization of isolated parts is considered as contradictory evidence). And still more, there are no other forms that can be compared with the Marsipobranchiates in even approximately so satisfactory a manner. Therefore, with no hesitation, the sub-class of Elasmobranchiates is placed as the succeeding term in the ichthyological series.

#### PLAGIOSTOMI.

On the whole, the Sharks appear to be the most generalized of the Elasmobranchiates, and there is little doubt but that the Rays are a more specialized offshoot from the same primitive stock.

#### HOLOCEPHALI.

More nearly related to the Sharks than to the Rays, but differentiated from representatives of a primitive line of descent, the HOLOCEPHALI claim the next consideration. If, in some respects, they appear to be more nearly related to the Ganoids, the Plagiostomes do in others, and it yet remains to be decided which are the most generalized in essential features. Meanwhile, it seems advisable to preserve the place for the Plagiostomi.

#### GANOIDEI.

By common consent, the Ganoids immediately succeed the Elasmobranchiates. Before considering the sequence of the forms, a brief inquiry into the constitution of the class may be seasonable.

#### HISTORICAL NOTE.

The name Ganoides (or Goniolepidoti) was originally framed by Prof. Agassiz<sup>1</sup> as an ordinal term for fishes having the scales (when present)

<sup>1</sup> 1<sup>er</sup> ordre. Ganoides Agass. (Goniolepidoti Agass.). Ecaillés anguleuses, rhomboidales ou polygones, formées de lames osseuses ou cornées, recouvertes d'émail.— Les familles des Lépidoides, des Sauroïdes, des Pycnodontes, des Sclerodermes, des Gymnodontes, des Lophobranches, etc. etc.—Agass. Recherches sur les Poissons fossiles, v. 2, p. 1.

angular and covered with enamel; and, in the group so characterized, were combined the Ganoids of subsequent authors as well as the Teleostean orders Plectognathi, Lophobranchii, and Nematognathi, and (subsequently) the genus *Sudis* (*Arapaima*), the last being regarded as a Coelacanth. The group has not been accepted with these limits or characters.

But the researches of Prof. Johannes Müller, on the anatomy and classification of the fishes, culminated at length in his celebrated memoirs on those fishes for which he retained the ordinal name Ganoidei; those memoirs have left an impression on Ichthyology perhaps more decided than made by any other contributions to the science, and that published *in extenso* will ever be classical; numerous as have been the modifications since introduced into the system, no forms except those recognized by Müller (unless it be Dipnoi) have since been interjected among the Ganoids.

Without premonition in any other form, the results of his studies of the Ganoids were announced to the Royal Academy of Sciences of Berlin in December, 1844,<sup>1</sup> and this communication was supplemented, on the 13th February, 1845, by observations on the bulbus arteriosus, and on the 12th March, 1846, by a more extended memoir, giving the results of subsequent investigations.<sup>2</sup> These were combined, and, with his previous contributions

<sup>1</sup> MÜLLER (Johannes). Über den Bau und die Grenzen der Ganoïden und über das natürliche System der Fische. . . . Gelesen in der Akademie der Wissenschaften, am 12 December, 1844.

Published in abstract in the Monatsberichte der Königl. Preuss. Akademie der Wissenschaften zu Berlin, 1844, pp. 416-422; in advance < Archiv für Naturgeschichte (Berlin), 11 Jahrg., b. I, 1845, pp. 91-141; in full (with modifications) < Abhandlungen der Königl. Preuss. Akademie der Wissenschaften zu Berlin, 1844 (1846), pp. 117-216, 6 pl.

The memoir, as published in the Archiv für Naturgeschichte, was translated into French, English, and Italian, viz:—

——— Mémoire sur les Ganoïdes et sur la classification naturelle des Poissons. . . .

< Annales des Sciences Naturelles, 3<sup>e</sup> série, v. 4, 1845, pp. 5-53.

This translation was by Dr. Carl Vogt, and was followed by an original memoir (Quelques observations sur les caractères qui servent à la classification des Poissons Ganoïdes. Par M. C. Vogt, pp. 53-68, pl. 9), detailing especially the results of his examination of *Amia* and first revealing its Ganoid characteristics.

——— On the Structure and Characters of the Ganoidei, and on the natural Classification of Fishes. . . . < Scientific Memoirs, selected from the Transactions of foreign academies of science and learned societies, and from foreign Journals, edited by Richard Taylor, v. 4, 1846, pp. 499-558.

<sup>2</sup> ——— Fernere Bemerkungen über den Bau der Ganoïden, . . . . < Monatsberichte, etc., 1846, pp. 67-85; also, < Archiv für Naturgeschichte, 1846, I, pp. 190-208.

——— Further Remarks on the Structure of the Ganoidei, . . . . < Scientific Memoirs, etc., v. 4, pp. 543-558.

to the knowledge of the natural families of fishes, somewhat modified, and published in the extended memoir which appeared in the Transactions (Abhandlungen) of the Society.

The memoir, as finally published in the Abhandlungen, contained additional details (on pp. 118, 126 to 129, physiological observations on the bulbus arteriosus;<sup>1</sup> pp. 154 to 195, Abschnitt II. über die natürlichen Ordnungen und Familien der Knochenfische<sup>2</sup>); the paragraphs on the Apodes, Esoces, Galaxiæ, and Clupesoces in the Archiv (pp. 181-184) were omitted, and a postscript (Nachschrift, pp. 204-208) was added containing the results of subsequent observations, and especially remarks on the genus *Amia* and Carl Vogt's researches thereon. This postscript was, in many respects, a reproduction of an article published in the Monatsberichte.

The memoir next in importance from the great light which was shed upon many obscure questions of Palæichthyology was contributed by England's great naturalist, Prof. Huxley.<sup>3</sup> In the article in question, though professedly upon the Devonian fishes, all that could render intelligible the forms treated was called into requisition, and many unexpected relations were demonstrated or approximated.

The discovery of a representative of the *Ceratodontids*, a type previously supposed to have become extinct in the triassic epoch, was the next event of importance; the most sagacious recognition of its affinities, evidence of extended knowledge, by its nomenclator (Dr. Kreft, of Melbourne, Australia), provoked earnest investigation of its structure, and to Dr. Günther (see p. xi), we are indebted for an elaborate description thereof. The light derived from this examination was reflected upon the allied extinct types, and it was clearly shown that the order, once regarded as so isolated, had been rich in representatives in the distant past.

And for various other additions to our knowledge of these forms, we are

<sup>1</sup> Published in the Archiv (pp. 138-141) as an appendix (Nachtrag) to his memoir on the Ganoids.

<sup>2</sup> Published originally in the Archiv für Naturgeschichte (9 Jahrg., b. I, p. 292-330), where it appeared with the title "Beiträge zur Kenntniss der natürlichen Familien der Fische," but considerably modified, and especially by the exclusion of the Dipnoan and Ganoid fishes from the series. See, also, pp. 155, 158 (Goboidei vice Cycloptodi), + 159-160 (Scales) 175-178 (Anacanthini), 182 (degrading Gomodontes), 186 (Aplocheiton, Microstoma), 187 (Galaxiæ), 188 (Esoces), 190-192 (Clupeidæ), 192 (+ Heteropygil), 193-194 (Apodes).

<sup>3</sup> HUXLEY (Thomas Henry). Preliminary Essay upon the Systematic Arrangement of the Fishes of the Devonian Epoch, . . . < Memoirs of the Geological Survey of the United Kingdom. Figures and Descriptions illustrative of British organic remains. Decade x., 1861, pp. 1-40.



indebted to the labors of Agassiz, Lütken<sup>1</sup> (see p. x), Cope (see p. x), and Lankester.

#### THE GANOIDS A NATURAL GROUP.

It has been objected that the Ganoids do not constitute a natural group, and that the characters (*i. e.*, chiasma of optic nerves and multivalvular *bulbus arteriosus*) alleged by Müller to be peculiar to the teleostomous forms combined therein, are problematical, and only *inferentially* supposed to be common to the extinct Ganoids so called, and, finally, such objections couched in too strong language have culminated in the assertion that the characters in question are actually *shared* by other physostome fishes.

No *demonstration*, however, has been presented as yet that any physostome fishes do really have the optic chiasma and multivalvular *bulbus arteriosus*, and the statement to the contrary seems to have been the result of a venial misapprehension of Prof. Kner's statements, or the offspring of impressions left on the memory by his assertions, in forgetfulness of his exact words.

But Prof. Kner,<sup>2</sup> in respect to the anatomical characters referred to, merely objects; (1) they are *problematical*, are not confirmable for the extinct types, and were *probably* not existent in certain forms that have been referred to the Ganoids; (2) the difference in number of the valves of the *bulbus arteriosus* among recent Ganoids is so great as to show the unreliability of the character; (3) a spiral valve is developed in the intestine of several osseous fishes ("genera of the so-called intermediate clupeoid groups") as well as in Ganoids; and (4) the chiasma of the optic nerves in no wise furnishes a positive character for the Ganoids.<sup>3</sup>

<sup>1</sup> The extended memoir of Dr. Lütken (Om Ganoidernes Begraendning og Inddeling) contains a valuable résumé of the history, up to 1867, of the Ganoids, as well as a full bibliography relating to the group, and a critical discussion of the forms referred to it.

<sup>2</sup> KNER (Rudolph). Betrachtungen über die Ganoiden, etc. < op. cit. (supra, p. 00), p. 522.

<sup>3</sup> Noch andere der angeführten Merkmale sind geradezu *problematisch*, da sie nur auf muthmasslichen Voraussetzungen und Annahmen beruhen, nicht aber als wirklich vorhanden nachzuweisen sind. Zu solchen gehören die von J. Müller für lebende Ganoiden hervorgehobenen anatomischen Merkmale: [1] der muskulöse Bulbus mit mehreren Klappenreihen, [2] das Chiasma und [3] die Spiralklappe im Darmcanal.

[1] Für die allermeisten fossilen Fische, die für Ganoiden gelten, ist *nicht nachweisbar*, dass diese Merkmale vorhanden waren und vielmehr mit Grund zu vermuthen, dass sie namentlich solchen nicht zukamen, die in alter Zeit als Prototypen späterer Teleostier auftreten, wie z. B. den triasischen Gattungen *Belonorhynchus*, *Pholidophorus* u. v. a. Allein ganz abgesehen hiervon, so dürfte doch darauf hinzuweisen sein, in welchem ungleichem Grade sich diese Merkmale selbst bei den verschiedenen Gattungen der le-

It will be noticed that all these objections (save in the case of the intestinal spiral valve) are hypothetical and vague. The failure of the intestinal spiral valve, as a diagnostic character, has long been conceded, and in this case only have the forms that *prove* the failure been referred to; in the other cases, where it would be especially desirable to have indicated the actual types falsifying the universality or exclusiveness of the characters, they have not been referred to, and the objections must be met as if they were not known to exist.

(1) The characters in question are, in the sense used, problematical, inasmuch as no examination can be made of the soft parts of extinct forms, but with equal force may it be urged that any characters that have not or cannot be *directly* confirmed are problematical, in the case of all other groups (e. g., Mammals), and it can only be replied that the co-ordination of parts has been so invariably verified that all probabilities are in favor of similar co-ordination in any given case.

(2) There is doubtless considerable difference in the number of valves of the *bulbus arteriosus* among the various Ganoids, and even among the species of a single family (e. g., *Lepidosteidae*), but the character of Ganoids lies not in the number, more or less, but in the greater number and relations (in contradistinction to the opposite pair<sup>1</sup> of the Teleosts) in conjunction with the development of a *bulbus arteriosus*. In no other forms of Teleostomes have similar relations and structures been yet demonstrated.

(3) The failure of the spiral intestinal valve has already been conceded, and no great stress has ever been laid on the character.

(4) The chiasma of the optic nerves is common to all the known Ganoids, and has not been found in those forms (e. g., *Arapaima*, *Osteoglossum*, and *Clupeiform* types) agreeing with typical physostome Teleosts in the skeleton, heart, etc., but which at the same simulate most certain Ganoids (e. g., *Amia*) in form.

benden Ganoiden vorfinden; man braucht sich nur [2] der grossen Differenzen in der Zahl der Aortenstiel-Klappen bei *Lepisosteus* und *Amia* zu erinnern, oder [3] des Umstandes, dass eine Spiralklappe im Darmcanale unter den lebenden Fischen nicht blos bei Ganoiden, sondern auch bei Selachiern und mehreren Knochenfischen (Gattungen der sogenannten intermediären Clupeiden-Gruppen) und nicht blos im Dünndarme, sondern auch in andern Abtheilungen des Verdauungsrohres sich vorfindet, und dass auch [4] die Chiasmabildung keineswegs einen verlässlichen Unterschied der Ganoiden abgibt.—Kner, op. cit., pp. 522-523.

This paragraph is the only one that squarely meets the question of the applicability of the *fundamental* characters of the Ganoids, as given by Müller. It need only be added that the ideas respecting *probability* of pertinence must be a reflection from the deductions resulting from a more or less thorough study of the known elements. The question as to the value of the chiasma is certainly disposed of in a very summary manner, but not in an equally satisfactory one.

<sup>1</sup> "The sunfish (*Orthogoriscus*) has four such valves."—Owen, Anat. Vert., I. 474.

Therefore, in view of the evidence hitherto obtained, the arguments against the validity of title, to natural consociation, of the Ganoids have to meet the positive evidence of the co-ordinations noted; the value of such characteristics and co-ordinations can only be affected or destroyed by the demonstration that in all other respects there is (1) very close agreement of certain of the constituents of the subclass with other forms, and (2) inversely proportionate dissimilarity of those forms from *any* (not all) other of the Ganoids, and consequently evidence *ubi plurima nitent* against the taxonomic value of the characters employed for distinction.

And it is true that there is a greater superficial resemblance between the Hyogonoids and ordinary physostome Teleosts than between the former and the other orders of Ganoids, but it is equally true that they agree in other respects than in the brain and heart with the more generalized Ganoids. They all have, for example, (1) the paragonal elements undivided (not disintegrated into hypercoracoid, hypocoracoid, and mesocoracoid), (2) a humerus (simple, or divided—that is, differentiated into metapterygium and mesopterygium), and (3) those with ossified skeletons agree in the greater number of elements in the lower jaw. Therefore, until these co-ordinates fail, it seems advisable to recognize the Ganoids as constituents of a natural series, and especially on account of the superior taxonomic value of modifications of the brain and heart in other classes of Vertebrates, for the same reason, and to keep prominently before the mind the characters in question, it appears also advisable to designate the series, until further discovery, as a subclass.

But it is quite possible that among some of the generalized Teleosts, at least *traces* of some of the characters now considered to be peculiar to the Ganoids may be discovered. In anticipation of such possibility, the author had at first discarded the subclass, recognizing the group only as one of the “superorders” of the Teleostomes, but reconsideration convinces him of the propriety of classification representing known facts and legitimate inferences rather than too much anticipation.

It is remembered that all characters are liable to fail with increasing knowledge, and the distinctness of groups are but little more than the expressions of our want of knowledge of intermediate forms; it may in truth be said that ability to segregate a class into well-defined groups is in ratio to our ignorance of all the terms.

#### SEQUENCE OF GANOIDS.

The questions, (1) which are the most generalized of the Ganoids, and (2) what is the most natural succession of forms, are not the simple problems they might appear to be, if only the histological condition of the skeleton should be taken into account. If, on the one hand, in such respects,

the Chondrosteans appear to approach the Elasmobranchiates most—on the other hand, in the development of the paragonal, and the structure of the base of the pectoral fin, they differ less from the ichthyoid Hyoganoids than do the Crossopterygians and the Dipnoans. Nevertheless, they seem on the whole to be the more direct representatives of the lineal succession from the Elasmobranchiates, although doubtless very much modified and different ordinarily from the unknown immediate representatives. This has been the view or at least the practice of all ichthyologists except Prof. Cope.

The eminent naturalist referred to has contended that the Chondrosteans were more nearly related to the typical fishes, and has (1) combined them as well as the Hyoganoids with the Teleosteans in a peculiar subclass (Actinopteri), while (2) the Crossopterygians were differentiated as another, and (3) the Dipnoans retained with similar rank.

The chief considerations, apparently, which induced Prof. Cope to isolate the Crossopterygians and combine the Chondrosteans with the forms referred to, were the result of his study of the pectoral members and their insertion, and the inference therefrom that there was an essential similarity therein between the Chondrosteans and Teleosts, and a fundamental dissimilarity between them and the Crossopterygians.

Apart from the development of a single or double ceratohyal, which was evidently regarded as of subordinate importance,<sup>1</sup> the only expressed differences between Cope's subclasses Crossopterygia and Actinopteri are found in the constitution of the pectoral fins, viz :—

**CROSSOPTERYGIA:** "Limbs having the derivative radii of the primary series on the extremity of the basal pieces, which are in the pectoral fin metapterygium, mesopterygium, and propterygium."

**ACTINOPTERI:** "Primary radii of fore limb parallel with basilar elements, both entering the articulation with scapular arch. Basilar elements reduced to metapterygium and very rarely mesopterygium. Primary radii of posterior limb generally reduced to one rudiment."

The question arises (1) whether the fundamental differences exist which appear to be expressed by the definitions cited; (2) the correlated one, whether too much importance may not have been attached to superficial relations of parts, and too little to fundamental homological relations, and (3) even if the homological relations are as dissimilar as the definitions would indicate, are they coincident with others, and thus really indicative of such high value.

#### EXCURSUS ON THE PECTORAL LIMB.

The diagnoses in question seem to be partly (*i. e.*, the articulation or not

<sup>1</sup> The Dipnoi have a double ceratohyal.

of the radii direct with the scapular arch) the expressions of matters of fact, and partly the interpretation of homologies.

It is assumed (1) that the external basal element of the limb in Chondrosteans is equivalent to the median element (when differentiated) of the plagiostome Elasmobranchiates, and is, therefore, the mesopterygium, and (2) that the propterygium is not developed.

It is not evident, however, why the external element should not be homologous, in part at least, with the propterygium of the Elasmobranchiates. The latter affords a better basis for identification, and it would seem more justifiable—if it must needs be identified with a *single* element—to refer it to the propterygium rather than to the mesopterygium. The mesopterygium may (1) either be represented, in the Chondrosteans, by an independent element ("r" in Gegenbaur's Untersuchungen), crowded out of place by the intervention of the rays (as in certain Raie), or (2) it may be entirely suppressed through atrophy, or (3) it may be fused with the propterygium (as in the Heterodontidæ and Scymnidæ).<sup>1</sup> In the first case, the *expressed* differences of the Crossopterygians would be confined to the exclusion of the actinosteal element from direct articulation with the scapular arch. But in the most teleosteid of the Ganoids (*Amia*), we find even that condition approximated, only one (of the seven actinosts) being articulated directly with the arch, the rest being connected with the metapterygium.

But even supposing that the mesopterygium is an element entirely wanting in the Hyoganoids and Chondrosteans, two elements (metapterygium and propterygium) are developed in those forms in common with the Crossopterygians, and which are wanting in the Teleosts. It is not evident why the development of a mesopterygium should be of importance so much superior to that of the other two elements, or why the mere fact that the articulation of the actinosts with the scapular arch should be of such paramount significance as to justify the combination of all forms agreeing therein (including the Chondrosteans and all Teleost fishes), and the separation therefrom, as co-ordinate terms, of forms not agreeing therein.

But it is true that the evidence appears to be somewhat contradictory as to the relations of the forms distinguished by the structure of the pectoral limbs as well as the scapular arch. On the one hand, the Chondrosteans (rather than Crossopterygians) agree with the Hyoganoids in the construction of the paraglenal element as well as the pectoral member; on the other hand, the Crossopterygians appear to agree more with the Elasmo-

<sup>1</sup> Most naturalists would probably prefer either of these interpretations to the homological representation in Chondrosteans, by a mesopterygium disintegrated and represented by apparent rays.

branchiates, and less with the Hyoganoids, in these respects. But the Crossopterygians agree with the latter much better in the composition of the skull and squamation, and the question therefore arises whether it is more probable that the Crossopterygians should have attained that specialized similarity to the Hyoganoids from an independent origin, or whether they should have departed (after having received such characters from a common progenitor) in the structure of the scapular arch and the pectoral member, and whether the *apparent* greater similarity in those respects to the Elasmobranchiates is not rather adaptive, or the result of simplicity of structure of the paraglenal. Possibly, the following hypothesis may approximate the truth, and account for the divergencies of the several types.

The Acanthodeans of the devonian and following epochs may be the nearest of kin known to the representatives of the direct line of descent from the typical Elasmobranchiates; the development of two marginal (external and internal) spines in the pectoral limb may lend significance to the specialized condition of the metapterygium and propterygium in the pectoral limbs of the succeeding forms, as may also the character of the scales for those of the typical "Ganoid" type.

#### CHONDROGANOIDS.

The Chondrosteans furnish the most satisfactory evidence of closest relationship with the ancestral stock in the histological condition of the skeleton, the generalized and little concentrated brachial and hyoid apparatus, and the structure of the fins. At the same time they are considerably removed from the direct line of descent.<sup>1</sup>

#### BRACHIOGANOID AND DIPNOAN OFFSHOOTS.

From the ancestral stock, somewhat more specialized than that from which the Chondrosteans originated, but with approximately the same pattern of pectoral limb, forms may have been developed in which the metapterygium and propterygium (converging towards the base in the Chondrosteans—and Acanthodeans?) finally approximated and grew together; the intervening cartilage (mesopterygium) became ejected and projected backwards, bearing the specialized actinosts on a convex periphery.

(1) From such an ancestor a long line may have descended which finally culminated in the specialized Crossopterygians now known.

(2) From an equally ancient stock, and deviating less in histological characters, the Dipnoans may have descended: in such forms, the metapterygium and propterygium, instead of diverging backwards, may have con-

<sup>1</sup> There are some reasons for thinking that the Selachostomi are the most generalized group of Ganoids.

tinued to grow together, ejecting more and more the mesopterygium, which would become, *pari passu*, correspondingly elongated and extended backwards; finally, it would become segmented, and the actinosts and rays having become lateral instead of terminal, the limb of *Ceratodus* would be developed.

(3) And finally, should the lateral elements and rays of the pectoral fin of *Ceratodus* become (1) successively aborted, and finally (2) entirely atrophied, the limbs of (1) *Lepidosiren* and (2) *Protopterus* would be reproduced.

In view of the varying combinations of the basal elements of the limbs in the Elasmobranchiates (e. g., *Scymnidæ*, in which all are consolidated), the suppositions thus hazarded do not appear to be unreasonable or opposed by histological or developmental principles or facts.

The question, how the limbs of the quadruped Batrachians have become specialized from such members, is foreign to the present inquiry.

#### HYOGANOIDS.

The question now recurs, what are the relations and nearest of kin of the Hyoganoids?

A more significant hint appears to be furnished by the structure and form of the scales of some of the representatives of the group, than by any other part of the structure.

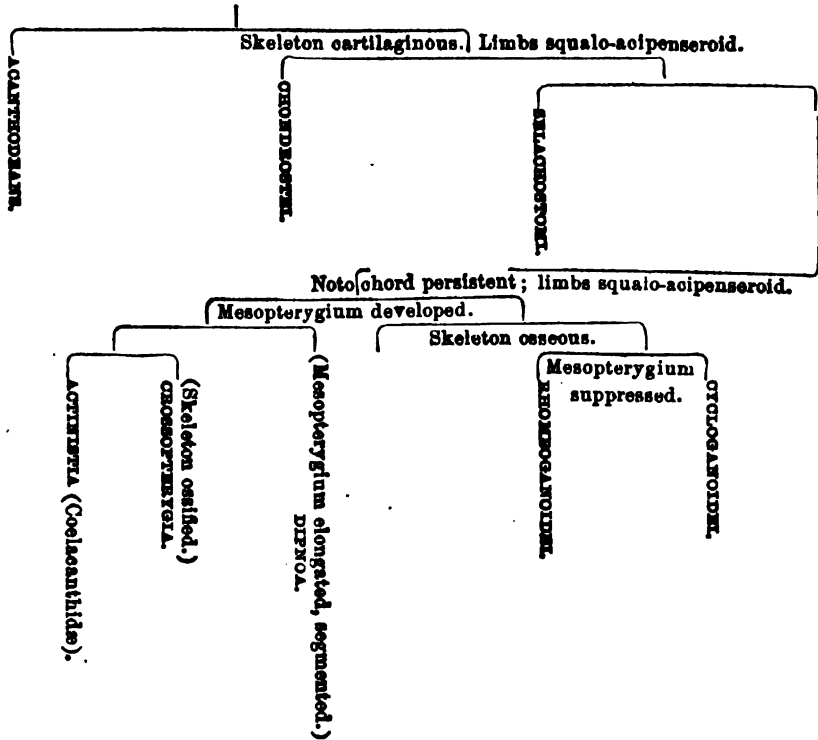
The similarity, in form as well as in intimate structure, of the scales of the Lepidosteids to those of the Polypterids is so close, and the peculiarities and specialized characters of those scales are so many, that the fishes distinguished by such common characters must have inherited them from a common progenitor. Any other supposition would be in opposition to the strongest probabilities. For it must be remembered that the community of character is not a general one like that between ordinary cycloid or ctenoid scales, but a close one of a very specialized and proportionately suggestive nature. This similarity is also coincident with a corresponding—though not so great—similarity of the skull, especially the suspensorial apparatus, etc.

But while the Polypterids have deviated widely in some respects—and, among others, in their limbs and the connections of the air-bladder and intestinal canal—from the primitive stock, the Lepidosteids, deviating equally in other respects, have done so less in respect to their limbs.

In the Lepidosteids and the Amiids are found the nearest representatives, among the Ganoids, of the line of descent in the direction of the typical fishes, as in the Crossopterygians and Dipnoans are found the nearest living forms in the line leading towards the Batrachians and higher Vertebrates.

## GENEALOGICAL TREE OF GANOIDS.

The following table is added as a graphic illustration of the views just unfolded :—



The left branches indicate the more generalized of the contrasted types. The quasi-diagnostic phrases pertain to the succeeding forms, hypothetical or known, till contradicted. The term "squalo-acipenseroid" is intended for a type more generalized than the acipenseroid, and devoid of the special modifications exhibited by the Chondrosteans.

The relations between the various representatives of the Ganoid subclass are very unequal, and they may be advantageously combined into groups more comprehensive than orders. In fine, following out the views just expressed, and subordinating the orders as recommended, we would have the following sequence, starting with the most generalized:—



## ? ACANTHODEI.

## SUPERORDER CHONDROGANOIDEI.

*(Aberrant.)*

Order Chondrostei.

Order Glaniosomi.

## SUPERORDER BRACHIOGANOIDEI.

*(Leading to the Dipnoans.)*

Order Actinistia.

Order Crossopterygia.

## SUPERORDER DIPNOI.

*(Leading to the Batrachians.)*

Order Sirenoidei.

## SUPERORDER HYOGANOIDEI.

*(Leading to the Teleosts.)*

Order Rhomboganoidei.

Order Cycloganoidei.

## ON THE TERMS "HIGH" AND "LOW."

The conclusions resulting from the study of the preceding types may render advisable the reconsideration of the reasons of the discrepancy existing among naturalists as to the sequence of the several forms referred to. It has been remarked (p. xx) that the reasons were obvious, and the discrepancies are undoubtedly (1) in part the results of the appreciation of certain truths, and their exaggeration at the expense of others, and to the neglect of the consequences flowing from that cause, and (2) partly of psychological prejudices.

It is a well-assured truth that the Dipnoans are the fishes most nearly related to the Batrachians, and consequently, if nothing else were to be considered, they should undoubtedly be placed next to them. But if this, *per se*, would be a satisfactory procedure, the problem then arises, what shall be done with the other forms? If the Dipnoans are at one extreme and the Leptocardians at the other, between them must necessarily intervene the typical fishes as well as the true Ganoids and the Elasmobranchiates. And if, now, the question of the relative position of the Dipnoans be properly settled, the equally important one—and more vital one on account of the numbers involved—recurs, are we any nearer the truth in approximating next to the Dipnoans, the Elasmobranchiates, the Ganoids, and finally the Teleosts, which last will be *next to the Marsipobranchiates*?

Or, is the question rendered any more easy by first *assuming* that the Elasmobranchiates are "*highest*" and *therefore* (but why?) next to the Batrachians, and then successively arranging the Ganoids, and the Teleosts, still retaining the last *nearest to the Marsipobranchiates*? Admitting that the Dipnoans and (*causa argumenti*) the Elasmobranchiates are the nearest allies of the Batrachians, are the Teleosts the nearest allies of the Marsipobranchiates? Are they in *any* essential respect more like them than are the others? Does the study of their homologies receive any light from the juxtaposition? Is any advantage gained? On the contrary, are not the questions remaining still more involved by reason of such sequence? Is not the natural sequence from the generalized to the specialized unnaturally interrupted and reversed? The answers are not dubious.

Again recalling the universal admission of the "low" or, rather, generalized attributes of the Leptocardians, we have in the ciliated clefts of their pharyngeal sack the first (known) rudiments of a specialized branchial apparatus; an enormous advance is exemplified in the branchial apparatus of the Marsipobranchiates (1. Hyperotreti, 2. Hyperoartii) which nevertheless is (it may be safely said) obviously homologous—*i. e.* homogenetic—with that of the Leptocardians; another advance, less but still very decided, is exhibited in the branchial apparatus of the Elasmobranchiates, while in the Chondrosteian and other Ganoids successively, more specialized phases are developed, and all in the *direction of the Teleosts*. We have, in these phases, an apt exemplification of the same concentration towards and in the head as is exhibited by the Tetradecapod and Decapod Crustaceans in their segments and appendages, and which have furnished to the learned Dana the first foundations for his hypothesis of cephalization. And from whatever standpoint we view the series of fishes, the facts of structure, of homologies, and of affinities receive the most light by their exhibition in the sequence advocated, *i. e.*, Leptocardia, Marsipobranchia, Pisces elasmobranchii, Pisces ganoidei, and Pisces teleostei.

And while most naturalists would probably not be indisposed to admit the natural character of the sequence up to the Dipnoans, the desire to have those forms in juxtaposition to the Batrachians and an exclusiveness of attention to that question might result in cutting the gordian knot by effecting that juxtaposition and practically ignoring the other difficulties.<sup>1</sup>

Two questions are principally involved in this consideration.

*First.* What is the *fish* most nearly to the Batrachians, and consequently to the quadruped vertebrates generally?

<sup>1</sup> Probably some of the results in systematic zoology are attained by (1) commencing with Man as the highest, and then (2) approximating successively certain forms, on account of real or supposed affinities, and with little care as to where other forms, whose affinities are less obvious, may lead.

*Second.* To what other forms is that fish most nearly related?

(1.) In response to the first question, no doubt has been expressed, the admission that the Dipnoans (and *a fortiori* the Lepidosirenids) are most nearly allied to the Batrachians being universal, even among those who place in the "highest" rank the Elasmobranchiates.

(2.) In response to the second question, the admission (*now* universal) that the Dipnoans are *fishes* determines the question that they are to be *treated* as fishes, and *collocated* in the series of fishes.

And now, if it becomes necessary to enumerate the forms of animals in a linear series, there are the *alternatives* of doing so at the expense of one or the other classes, for (it is scarcely necessary to add) a linear series cannot exhibit all the affinities of living beings.

But it being admitted that the Dipnoans are *Fishes*, it would surely be unreasonable to *overturn* the natural series of the latter *only* to exhibit representatives thereof in juxtaposition to the Batrachians. The alternative then remains to accommodate ourselves to the facts of the case, to build upon the sure foundations furnished by the concurrent admission of what are the most generalized types, and then successively approximating whatever forms are *most nearly related* to the preceding, and without necessary consideration of where we may end—for, commencing aright, we cannot wander very far from the right path.

And if it is admitted that the sequence up to the Dipnoans is not an unnatural one, we have chiefly to inquire what are the forms most nearly related to *them*. It must be admitted that (among living forms) the Crossopterygians are nearest related on one side, and the Batrachians on the other, but the former in very much closer bonds than the latter. And with this concession, we have next to inquire what are the most nearly related to the Crossopterygians. And, in the direction of the Teleosts, it can scarcely be denied that the Hyogonoids are such forms. The relations of the last to the Teleosts are so obvious that it is unnecessary to proceed further.

And if it be demanded, how then can the facts be best expressed? reference may be made to the genealogist. He has to deal with similar problems so far as linear sequence is concerned, and the methods employed by him may be advantageously adapted in biological taxonomy.

Let the Dipnoan be considered as the eldest representative of the ancestral stock equally of the Fishes and of the Batrachians, from which the respective forms have descended, diverging more and more in the course of time. Of course, the Dipnoan will be more nearly related to the Batrachians than the Fishes diverging from the same stem—as the grandparent is more nearly related to the children of two sons than such grandchildren by the different sons are to each other.

But the genealogist takes the eldest branch of the family, and continues

to project the series formed by the representatives thereof till it is exhausted, and then recommences with the next.

In like manner, may we take, as the quasi-eldest, the form most like (in essential features) the most generalized type, and continue the series till it is exhausted.

Applying the hint to the problem under consideration, we may take the Crossopterygian as the most nearly related to the Dipnoan, and the representative of the quasi-eldest branch, and continue the series by the successive juxtaposition of the forms next most allied till the pisciform series is exhausted. Then may we resume the broken thread, and recommence from the same ancestral stock with the quasi-younger branch, the Batrachian, and treat it in the same manner. In this way, the natural sequence of types would be preserved, and the least confusion engendered.

And almost all the doubt and obscurity that reign over such questions result from the confusion between the terms high and low with generalized and specialized.

Inasmuch, for example, as the Dipnoan is (1) the most generalized, and therefore (2) more nearly related to the Batrachian than the typical fishes, because (1) of that nearer affinity, and (2) the recognition of the quadruped type as "highest," it is called "higher" than the fishes.

Perhaps there are no words in science that have been productive of more mischief and more retarded the progress of biological taxonomy than those words, pregnant with confusion, HIGH and LOW, and it were to be wished that they might be erased from scientific terminology. They deceive the person to whom they are addressed; they insensibly mislead the one who uses them. Psychological prejudices and fancies are so inextricably associated with the words that the use of them is provocative of such ideas. The words generalized and specialized, having become almost limited to the expression of the ideas which the scientific biologist wishes to unfold by the other words, can with great gain be employed in their stead.

#### TELEOST SERIES.

##### TELOCEPHALI

Among the most generalized of the typical fishes, and which have been by common consent regarded as most nearly allied to the Ganoids, are the physostomous Telecephals, best known under the forms of the *Cypri-nids*, *Clupeids*, and *Salmonids*. With these, the Pikes, Scomberesocids, and Perches, and, in fact, all those forms most familiar to men at large, numerous as they are, appear to agree in all material respects as to skeletal peculiarities and the character of the brain. With the reservations already

(p. 60) made and those of like character, it may be said that a *general*<sup>1</sup> description of the skull and shoulder girdle of a cod, a perch, a mullet, a pike, a salmon, or an electrical eel would *almost* equally well apply to the one as to the other, or any other Teleostean fish, so far as the *simple number* and *essential connections* of the bones are concerned. The frontal bones may be single or double, the anterior sphenoid (Cuv.) may be present or absent, the palatine and pterygoid bones may be distinct, or (as in the electrical eel) in part fused together, the scapular arch may be attached by one or two processes to the skull, a mesocoracoid may or may not be persistent, and even the paraglenal bones may be quasi-cartilaginous, but the agreement in other respects is so close in contrast with the representatives of other orders, that the exigencies of classification seem to be best met by the union of all such in one order. In all, the deviations in the skull are comparatively slight, and the scapular arch is composed of a post-temporal and posterotemporal, the latter connecting with the proscapula, while the paraglenal or coracoid is differentiated into at least a hypercoracoid and a hypocoracoid, the latter two bearing the actinosts which are generally four or (rarely) five in number. With the posterotemporal or proscapula is connected a "postclavicle" from which is generally developed a second distal bone, and sometimes (in Clupeidæ) several. The brain, heart, and vascular system generally, and hyo-branchial apparatus are fundamentally similar, but exhibit (especially the last) minor modifications that indicate narrower differences, and that may be used in the distinction of inferior groups. For all the forms possessing the common characters alluded to, may be retained the ordinal name TELEOCEPHALI, already referred to.

If a typical physostome fish (*e. g.*, Clupeid) and a specialized physoclyst form (*e. g.*, *Perca*, *Blennius*) are contrasted, the differences certainly appear to be considerable, and are exhibited in (1) the presence or absence of a ductus pneumaticus, (2) the position of ventrals, abdominal or anterior, (3) the presence or absence of a mesocoracoid, (4) the junction of the parietals, or their separation by the intervention of the supraoccipital, (5) the presence of articulated branching rays or their representation by spines, (6) the low or comparatively high insertion of the pectoral fins, and (7) the course of the lateral line, whether decurved in the direction of the abdomen or curved in the direction of the back. But distinct as these forms appear to be when contrasted, numerous forms intervene in which the characters successively disappear, or are combined in different ways, and the most esteemed differential characters (presence or absence of the ductus pneumaticus)

<sup>1</sup> I trust that the reservations and explanations which accompany this statement, and the connection in which it occurs (the discussions of orders), may prevent me from being misunderstood.

cus) are found in forms on the one hand so closely related (Cyprinodontids vs. Syngnathids) and on the other so much differing from the next adjoining forms, that the demands of classification appear to be best met by their union in one order. Of that order, the typical physostome fishes are among the most generalized.

But while the most generalized of the physostome Teleostei seems to have inherited and retained, in greater measure than any other forms, the primitive characters of the common progenitors of the Teleost fishes, others seem to present claims, but little inferior to theirs, to the rights of primogeniture. It is, too, quite possible that proofs may yet be produced of the superior rights of such claimants; it may be demonstrated that on the whole, such present more features in common with the ancient types than those forms to which the rank is now conceded, and that the specialized characteristics which now exclude them, are not co-ordinated with other equally specialized characters, and have not the significance they now seem to, but so far as present evidence goes, the claims of the physostome Teleostei appear to be superior to those of any other forms.

But from an almost equally generalized stock, and without evidence of very close relationship with any existing or known forms, the *Scyphophori* and succeeding families seem to have sprung.

#### SCYPHOPHORI.

The SCYPHOPHORI appear to be sufficiently differentiated from the physostomous Teleostei by the characters assigned by Cope, as well as other details of the skeleton, and the structure of the brain. On the whole, they appear to be most nearly related among the Teleostei to the Gymnonoti.

#### NEMATOGNATHI.

The NEMATOGNATHI depart still further from the ordinary Teleostei type in the composition of the skull, and especially the union *inter se* of various elements, as well as in the shoulder girdle, while the peculiar development of the brain confirms the validity of the separation. Their nearest relations appear to be with the Scyphophori. The nearer affinities claimed to exist between them and the Ganoids are not evident, and even the union of the parietal elements is probably the result of coalescence rather than of primitive homogeneity, such as prevails among the Ganoids.

#### APODES.

The APODES are much diversified among themselves, and have been dismembered by Prof. Cope into several orders, but they have the same common form and greatly increased number of vertebrae, want of ventrals, simple structure of the rays of the fins, restricted branchial apertures, and

(e. g. *Synbranchus*, *Anguilla*, *Muraena*), similar brain, so that in default of sufficient opportunity to study the skeleton,<sup>1</sup> the author provisionally, at least, retains them united, but admitting Cope's orders as suborders. Their affinities through the more generalized forms of the order are possibly with the *Gymnonoti*, but the hints furnished by the elongated body and increased number of vertebræ, etc., may be illusive.

#### OPISTHOMI.

The *Notacanthidæ* and *Mastacembelidæ* have recently been widely separated,<sup>2</sup> and by Cope, an order (Opisthomi) has been established for the last,<sup>3</sup> but, as long ago shown by Johannes Müller, both the forms in question agree in the withdrawal of the shoulder girdle from the skull, and its connection with the vertebral column, and this character seems sufficient, associated as it is with general agreement in other respects between the two families and great dissimilarity from other fishes, to isolate the forms thus marked as a peculiar order;<sup>4</sup> for this order, the name OPISTHOMI, proposed by Cope for one of its members, will be very appropriate, and may be adopted for the enlarged group. It is not obvious what better place can at present be assigned to them than proximity to the Apodes, although it will probably be eventually found to have closer relations with other forms.

#### HEMIBRANCHII.

The order HEMIBRANCHII, framed by Cope for the group here adopted, seems to be also well worthy of recognition; and, in addition to the characters assigned by its founder, is distinguished (i. e., *Gasterosteidæ*, *Fistulariidæ*) by the structure of the shoulder girdle and the skull, as shown by Parker in the case of the *Gasterosteidæ* (*Shoulder Girdle*, p. 39).<sup>5</sup> The nearest relations, according to Cope, are apparently with the *Atherinidæ*, but such are not obvious, nor are they more so with the *Siphonognathidæ*, with which they have also been in part compared.

#### LOPHOBRANCHII.

The order LOPHOBRANCHII, according to Prof. Cope, is most nearly related to the Hemibranchii, and such appears to be probable; some members of the order Hemibranchii (*Fistulariidæ*) had, indeed, been long previously

<sup>1</sup> I have only been able to study the osseous structure of *Anguilla* and *Muraena*.

<sup>2</sup> See Günther, Cat., v. 3, Syst. Synopses, pp. viii. x.

<sup>3</sup> No reference is made by Prof. Cope to the *Notacanthidæ* in any connection.

<sup>4</sup> Of course, *Tetragonurus*, which Müller, who was unacquainted with it, hinted might belong here, has no relation with the group.

<sup>5</sup> Before I was aware of the peculiarities of the shoulder girdle, and only knowing the characters assigned to the order by Cope, I retained it in the order Telecephali.

placed in juxtaposition to the Lophobranchii (*e. g.* by J. E. Gray, White, and Canestrini), but, no sufficient reason having been given or being apparent, the collocation has been disregarded.

The order (at least after the exclusion of the family of the Pegasidæ) has been almost universally admitted. The Pegasidæ have been eliminated and raised to ordinal rank by A. Duméril, with the name HYPOSTOMIDÆ; associated with the ordinary fishes by Steenstrup and Günther; and referred to the order Hemibranchii by Cope. Having seen only alcoholic specimens, and no skeleton of this form, the author has not been able to form an opinion.

#### PLETOGNATHI.

The order of PLETOGNATHI has been almost as universally admitted as the former, but has been criticized by M. C. Dareste,<sup>1</sup> and stated to be an unnatural association, whose members had diverse relations.

The fishes combined under this name by Cuvier have, however, many characters in common, and are distinguished by the fusion of the several elements of the lower jaw (dentary, angular, and articular) into one; the intermaxillaries and supramaxillaries are more or less closely united; the interoperculum is reduced to a rod-like element, dis severed from connection with the other bones, advanced far forward, and connected by ligament with the lower jaw; the pre-operculum and operculum are articulated with the hyomandibular bone, and the latter, as well as the sub-operculum, are very much reduced in size. The post-temporal unites, more or less intimately, with the skull; the hypo-coracoid is extended downwards. The brain, vascular system, and closed air-bladder do not differ very much from those of the acanthopterygian fishes.

DARESTE (CAMILLE). Thèses soutenues devant la Faculté des Sciences de Paris, par M. Camille Dareste, Licencié ès-sciences naturelles, Docteur en médecine, Professeur d'Histoire naturelle au Collège Stanislas.—Première Thèse. Recherches sur la classification des Poissons de l'ordre des Plectognathes.—Examen de la place que doit occuper dans la classification le Poisson décrit par S. Volta, sous le nom de *Blochius longirostris*.—Paris. Imprimerie de L. Martinet, . . . 1850. [4to., 46 pp.]

— Recherches sur la classification des poissons de l'ordre des Plectognathes. . . . < Annales des Sciences Naturelles.—Zoologie, 3e Série, t. 14, 1850, p. 105–133.

— Sur les affinités naturelles des poissons de la famille des Balistes. Note de M. C. Dareste, présentée par M. Blanchard. < Comptes Rendus hebdomadaires des séances de l'Académie des Sciences, (Paris), v. 74, pp. 1527–1530. (17 Juin, 1872).

— On the Natural Affinities of the Balistidæ. < Annals and Magazine of Natural History. 4th series, v. 10, pp. 68–70, July, 1872.  
A translation of the preceding.



Some of these characters are *diagnostic*, that is, they distinguish the forms from all others; others may be shared with isolated forms of widely separated groups; but the agreement of the "Plectognaths" among themselves in the many *common* characters justifies their association together, and the characters that are *peculiar* to them sanction their isolation as a group.

Three well-defined groups exhibit the principal modifications under which the fishes possessing these common characters are developed. They are principally distinguished by the development of the scapular arch (the hypercoracoid is atrophied in the Gymnodonts), the degree of union of the jaws and the dentition, and by the squamation. But while the external differences between these forms are doubtless very considerable, they all share the common characters above enumerated and other less salient ones, and in view of this much nearer connection, in contrast with other forms, seem most decidedly deserving of retention together, in contrast with other fishes, whatever rank may be conferred on the group. Their differences sink into comparative insignificance, when compared with their common characters, and seem not entitled to more than subordinal value, while the group of which they are constituents may be most aptly considered an order, as has been done by almost all ichthyologists. The Scleroderms have furnished the chief basis for dissent as to the homogeneous character of the order, and have been deemed more related to ordinary Acanthopterygian types than to the other admitted Plectognaths. And it is quite true that they (and especially the *Triacanthids*) are much more similar to the ordinary fishes than are the typical Plectognaths. This, however, is quite explicable by the supposition that they are the most generalized, and represent the immediate line of descent, while the others are more specialized. That the likeness, however, is superficial and illusive, is evident from the disagreement from the types they must resemble in form, in anatomical characters, and their agreement therein with the other Plectognaths, as already indicated. Prof. Cope has considered the relations of the order (through the *Triacanthids*, on the one hand, and the *Chaetodontidæ* and *Acronuridæ* on the other) to be most intimate with the Teleocephals at the point indicated, and M. Dareste has contended that the *Balistidæ* are especially related to the *Acanthuridæ*. As there seems to be no proof of any nearer relations elsewhere, the hint furnished by the agreements inducing such belief may be followed in the arrangement and sequence of the order as well as of the families constituting it.

#### PEDICULATI.

The only order adopted remaining for consideration is that of PEDICULATI. The natural character of the association of forms combined therein is obvious, and has never been questioned, and the comparatively slight

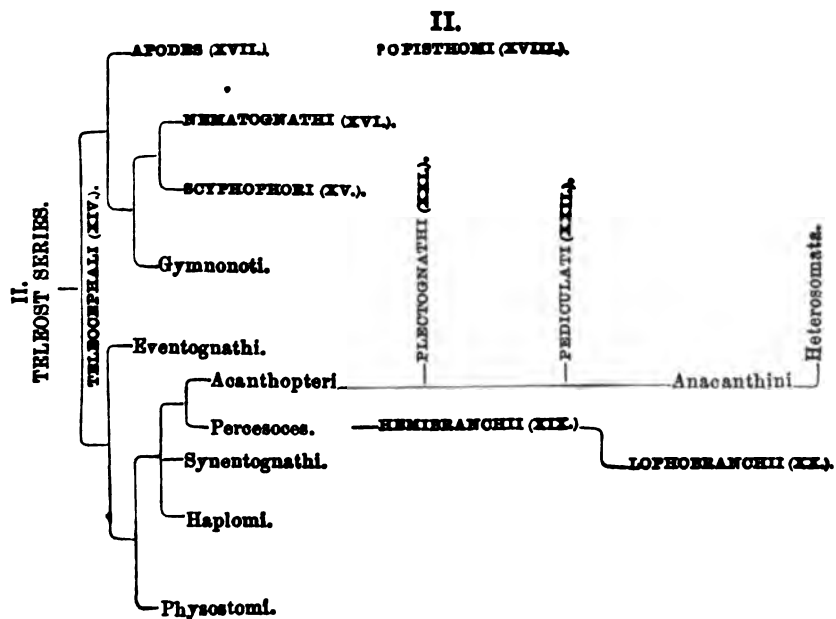
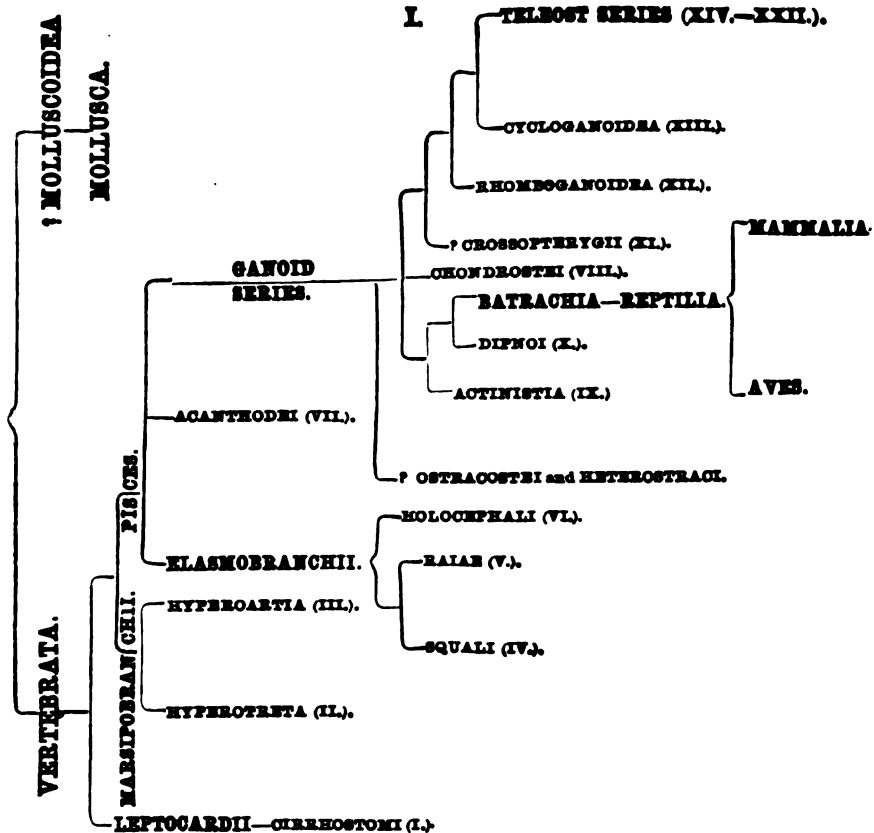
affinity with them of the *Batrachids*, which were formerly combined with them, is now universally conceded. The chief problem with regard to them, therefore, is confined to the question as to the taxonomic value of the characters distinguishing them from other forms. In consideration of the isolation of the group, the saliency of the characters distinguishing them, and the disturbance their intrusion among the Teleocephals would induce, they are distinguished by ordinal rank. Their relations are most intimate with the Batrachoid and Blennioid forms, and doubtless they have descended from the same common progenitors.

### GENETIC RELATIONS AND SEQUENCES.

In further explanation respecting the relations of the various forms, it may be remarked that immediate sequence does not by any means necessarily imply immediate affinities. In view of the complex and manifold relations existing, it is generally only possible in a linear arrangement to indicate the nearest relations on *one* side. The most convenient mode of arranging forms in a linear succession appears to be in series,—that is, taking a number of types and arranging them successively, having regard to the forms next most allied, till the series is exhausted; and then recommencing anew with that series whose first member is most nearly allied to one of the preceding:—in other words, following a genealogical system and assimilating it to a scheme, where we would have a given ancestor, and then (1) eldest son, (1a) eldest grandson, (1b) eldest great-grandson, etc.; and after giving all terms of such lineage, we would recommence with the (2) second son and proceed with his descendants in like manner.

The arrangement to really express such relations or quasi-relations would, however, demand a knowledge of fishes which no one now possesses, and consequently no attempt has been made in this article to exhibit them; frequently, indeed, the relations deemed most probable by the author have been violated in deference to general opinion. But without going into details, the following quasi-genealogical tree will convey the views of the author respecting the relations of the major groups, the first table exhibiting the relations of the more generalized orders, and the last of the orders as well as suborders of the Teleost series. In all cases (except the Vertebrates and Molluscoids), the branch to the left—major as well as minor—indicates the supposed most generalized type of the two or more springing or diverging from the same common stem:—

The names printed in largest capitals indicate branches; those in smaller, classes and subclasses; and those in smallest, orders; whilst suborders are printed in lower case.



On the assumption that the GYMNONOTI, the SCYPHOPHORI, and the NEMATOGNATHI on the one hand, and the APODES on the other, are derivatives from the Physostome Teleocephals or their immediate progenitors, they should, perhaps, be projected after the Teleocephals as successively more differentiated offshoots, but for the present, at least, it is deemed advisable to retain them in the customary position; it is to be understood, however, that they form a diverging line from the supposed common stock, and hence the sequence adopted in the list of families.

In addition to the orders here mentioned, several others appear to be represented by extinct fishes, but we are not sufficiently acquainted with the details of their structure to introduce them with certainty in the system. It may be suggested, however, that one of the orders is constituted of the PLACOGANOIDEI (when restricted to such forms as *Pterichthyidæ* and *Coccosteidæ*); another is represented by the triassic and cretaceous Ganoids with a persistent notochord, ordinary pisciform proportions, and non-lobate pectoral fins, such as the *Caturidæ*. Further details respecting at least the scapular arch and pectoral limb (probably erroneously restored, for the latter, by authors) are requisite before their exact relations can be understood.

#### FAMILIES.

The families have been much multiplied, and, it may be urged, unduly so, and such may really be the case, but as analysis should precede synthesis, and as many of the more comprehensive families have either not received diagnoses common to and at the same time peculiar to all their constituents; or, in case of applicable diagnoses, the characters are of suspicious value, it has been deemed best to isolate the groups as families, and allow them to stand on their own merits. Several of the families admitted (*e. g.*, *Gadiform*, *Labyrinthiform*, *Scombriform*, *Perciform*, *Siluriform*), are, however, of very dubious value, and are only provisionally adopted and kept in prominence to attract future examination.

There will doubtless always exist more or less difference of opinion as to the taxonomic values of groups, and all that can be hoped for is essential concurrence of views as to the mutual relations of the various groups and their respective degrees of subordination. Ichthyology has not yet, however, reached that stage wherein even an approximate concurrence in any of these points is possible; and it is not to be wondered at that the greatest difference of opinion should prevail with respect to families. Much of this dissent is due to the fact that certain groups stand isolated from others, and the relations *inter se* of the constituents of such groups are so obvious and evidently suggestive, and contrast so strongly with any other group that, although many and very marked dif-

ferences exist among the constituents, they are overshadowed by the closer agreement as compared with other groups, and the tendency, therefore, is to depreciate their value. The NEMATOGNATHI is a case in point. The ordinal or even subordinal value of the group has been admitted by few, and generally it is considered as a member of the "order Physostomi," and as it is really a natural and homogeneous group and strongly contrasts with any other, by many it has been endowed with only family rank. Yet the internal and external differences existing within its limits are very great, and really as obvious and by every analogy as important as those which the mind has become habituated to consider as of family value in other cases. And furthermore, the anatomical characters differentiating the group from others are many, striking, and, as shown by the extent of variation within other groups, very important. The exigencies of classification, therefore, seem to demand in such a case ordinal distinction, and then the constituents of the group naturally resolve themselves into sections whose importance, not being weighed in bulk against another family, can be appreciated, and the mind is prepared to admit their superior value.

#### ACKNOWLEDGMENTS, ETC.

Among those recent works mentioned in the bibliography or incidentally in the introduction, he has been especially benefited by the memoir of Prof. Cope, so often referred to. If he has sometimes found reason to express dissent from that eminent naturalist, it is because the importance of the memoir in question and the extensive knowledge of its author, have induced him to review and weigh the evidence affecting the questions in dispute. And the superior ability and learning of Prof. Cope appeared to demand reasons for any dissent from his views.

In order to enhance the usefulness of the catalogue, references are made to Dr. Günther's "Catalogue of Fishes in the British Museum," that being emphatically the *vade-mecum* for the working ichthyologist, and necessary to be constantly referred to for identifications, verifications, or references. In addition, in some cases, references are made to other publications, and when the names repeated from such authorities are not recognized by or are different from those employed by Dr. Günther, or when they accompany different groups, the reference to Günther's work is generally abbreviated and inclosed in parentheses after the primary reference, thus, "(G. iii., 200-205)."

Specific acknowledgment is due to the greatest of Spanish naturalists, Prof. Poey, of Havannah, Cuba, for his courteous attentions for many years, especially manifested in the transmission, for my use, of the fishes of Cuba, including many of the types of his new species; I am also indebted

to him for the skulls and more or less of the skeletons of numerous species, and among them of such forms as *Polymixia*, *Scombrops*, *Etelis*, *Platynius*, *Brotula*, *Lucifuga*, and the rarer forms of other families. I have likewise, through the courtesy of the officers in charge, been able to make free use of the Army Medical Museum.

Acknowledgments are also due to Mr. J. CARSON BREVOORT, of Brooklyn, and to Prof. O. C. MARSH, and Mr. OSCAR HARGER, of Yale College, for the loan of books, and other bibliographical facilities.

In conclusion, the author begs to renew the assertion that the list is in the strictest sense a temporary one, and merely preliminary to renewed investigations, and that the sequence of families is not to be regarded as the expression of the views of the author, except in part. The true exposition of his present views respecting the system are embodied in the preceding essay, and especially in the discussion of the sequence of forms.

Comparative diagnoses, embodying the chief anatomical characteristics of the orders and suborders in analytical tables, had been prepared for an appendix to this volume, but it has been finally deemed by the author best to defer the publication to a future time, and until he has been able to examine the anatomy of several doubtful forms. Immediate insertion is the less called for inasmuch as the remarks in the course of this introduction will suffice to give an idea of the characters of most of the larger groups adopted.

# FAMILIES OF FISHES.

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## CLASS PISCES.

### SERIES TELEOSTOMI.

#### SUB-CLASS TELEOSTEI.

#### PLECTOGNATHI.

##### GYMNODONTES.

1. Orthagoriscidae      Gymnodontes (Molina), Gthr.  
viii, 269, 317.
2. Tetrodontidae      Gymnodontes (Tetrodontina),  
Gthr. viii, 269, 270.
3. Triodontidae      Gymnodontes (Triodontina),  
Gthr. viii, 269, 270.

##### OSTRACODERMI.

4. Ostraciontidae      Sclerodermi (Ostraciontina)  
Gthr. viii, 207, 255.

##### SCLERODERMI.

5. Balistidae      Sclerodermi (Balistina), Gthr.  
viii, 207, 211.
6. Triacanthidae      Sclerodermi (Triacanthina),  
Gthr. viii, 207, 208.

- |                    |  |
|--------------------|--|
| 14. Soleidae       | Pleuronectidae, Gthr. iv, 399,<br>462-504. |
| 15. Pleuronectidae | Pleuronectidae, Gthr. iv, 399,<br>401-457. |



## ANACANTHINI.

- |                     |  |
|---------------------|--|
| 16. Macruridae      | Macruridae, Gthr iv, 390-398.                      |
| 17. Congrogadidae   | Ophidiidae (Congrogadina), Gthr. iv, 370, 388-389. |
| 18. Fierasferidae   | Ophidiidae (Fierasferina), Gthr. iv, 370, 381-384. |
| 19. Ophidiidae      | Ophidiidae (Ophidiina), Gthr. iv, 370, 376-380.    |
| 20. Brotulidae      | Ophidiidae (Brotulina), Gthr iv, 370, 371-376.     |
| 21. Brotulophididae | Ophidiidae (Brotulina), Gthr. iv, 370, 375.        |
| 22. Bregmacerotidae | Gadidae, Gthr. iv, 326, 368-369.                   |
| 23. Ranicepitidae   | Gadidae, Gthr. iv, 326, 367-368.                   |
| 24. Gadidae         | Gadidae, Gthr. iv, 326, 327-364.                   |
| 25. Merluciidae     | Gadidae, Gthr. iv, 326, 344-346.                   |
| 26. Lycodidae       | Lycodidae, Gill, P. A. N. S. Phil., iv, 319-326.   |

## ANACANTHINI? INCERTÆ SEDIS.

- |                   |                                    |
|-------------------|------------------------------------|
| 27. Ateleopodidae | Ateleopodidae, Gthr. iv, 318, 398. |
|-------------------|------------------------------------|

28. Xenocephalidae, Anacanthini gadoidei (Appendix), Gthr. iv, 399.  
 29. Ammodytidae Ophidiidae (Ammodytina), Gthr. iv, 384, 387.  
 30. Gadopsidae Gadopsidae, Gthr. iv, 318. (D. x-xi, 25-26. A. iii, 18-19.)

## ACANTHOPTERI.

*(Blennioidea.)*

31. Cryptacanthidae Cryptacanthidae, Gill, Can. Nat., 1865. (G. iii, 206, 291.)  
 32. Stichaeidae Stichaeidae, Gill, P. A. N. S. Phil. (Gthr. iii, 206, 280.)  
 33. Xiphidiontidae Xiphidiontidae, Gill, Can. Nat., 1865. (G. iii, 206, 285-291.)  
 34. Acanthoclinidae Acanthoclinidae, Gthr. iii, 297-298.  
 35. Chaenopsidae Chaenopsidae, Gill, An. Lyc. N. H. N. Y., viii, 141-144.  
 36. Nemophididae Nemophididae, Gill, An. Lyc. N. H. N. Y., viii, 138-141.  
 37. Anarrhcadidae Anarrhcadidae, Gill, Can. Nat., 1865. (G. iii, 208-211.)  
 38. Cebidichthyidae Cebidichthyidae, Gill, P. A. N. S. Phil., 1865. (G. iii, 206.)  
 39. Blenniidae Blenniidae, Gthr. iii, 206, 211-279.

40. Pataecidae                      Blenniidae, Gthr. iii, 206,  
292–293.

(*Batrachoidea.*)

41. Batrachidae                      Batrachidae, Gthr. iii, 166–  
177.

(*Trachinoidea.*)

42. Leptoscopidae                      Leptoscopoidae, Gill, P. A. N.  
S. Phil., 1862, 501–505.  
43. Dactyloscopidae                      Leptoscopoidae, Gill, P. A. N.  
S. Phil., 1862, 501, 505–506.  
44. Uranoscopidae                      Uranoscopoidae, Gill, P. A. N.  
S. Phil., 1861, 108–117.  
45. Trachinidae                      Trachinidae, Gthr. ii, 225,  
232–237.

(*Trichodontoidea.*)

46. Trichodontidae                      Trichodontoidae, Gill, P. A. N.  
S. Ph., 1861, 514. (G.ii, 250.)

(*Gobiesocoida.*)

47. Gobiesocidae                      Gobiesocidae, Gthr. iii, 489–  
515.  
48. Liparididae                      Cyclopteridae (Liparidina),  
Gthr. iii, 154, 154–158.  
49. Cyclopteridae                      Cyclopteridae (Cyclopterina),  
Gthr. iii, 154, 158–165.

*(Gobioidea.)*

50. *Platypteridae*      *Gobiidae* (*Callionymina*), Gthr. iii, 1, 138.
51. *Callionymidae*      *Gobiidae* (*Callionymina*), Gthr. iii, 1, 138-152.
52. *Gobiidae*      *Gobiidae* (*Gobiina*), Gthr. iii, 1, 3-133, 152-153.

*(Cottoidea.)*

53. *Triglidae*      *Triglidae* (*Cottina* gen. + *Cataphracti* gen.), G. ii, 191-210, 216-224.
54. *Agonidae*      *Triglidae* (*Cataphracti* gen.), Gthr. ii, 211-216.
55. *Cottidae*      *Triglidae* (*Cottina*), Gthr. ii, 152-175.
56. *Platycephalidae*      *Triglidae* (*Cottina*), Gthr. ii, 176.
57. *Hemitripterae*      *Triglidae* (*Scorpaenina*), Gthr. ii, 143.
58. *Scorpaenidae*      *Triglidae* (*Scorpaenina*), Gthr. ii, 95.
59. *Chiridae*      *Triglidae* (*Heterolepidina*), Gthr. ii, 91-95.

*(Pharyngognathi.)*

60. *Scaridae*      *Labridae* (*Scarina*), Gthr. iv, 65, 208-240.

61. Siphonognathidae    Labridae (Scarina), Gthr. iv,  
65, 243-244.
62. Labridae            Labridae, Gthr. iv, 65, 69-208,  
240-243.
63. Pomacentridae      Pomacentridae,    Gthr.    iv,  
2-64.
64. Cichlidae           Chromides, Gthr. iv, 265-  
316.
65. Embiotocidae       Embiotocidae, Gthr. iv, 244-  
251.
66. Gerridae            Gerridae, Gthr. iv, 252-264;  
(also, i, 339-354.)

(*Labyrinthici.*)

67. Helostomidae       Helostom[idae], Cope, Tr. Phil.  
Soc. xiv, 459. (G. iii, 377.)
68. Anabantidae       Anabantidae, Cope, Tr. Phil.  
Soc. xiv, 459. (Gthr. iii, 372.)
69. Osphromenidae      Osphromenidae, Cope, Tr. Phil.  
Soc. xiv, 459. (Gthr. iii, 382.)

(*Polynematoidea.*)

70. Polynemidae       Polynemidae, Gthr. ii, 319-  
333.

(*Acronuridae.*)

71. Acanthuridae       Acronuridae, Gthr. iii, 325-  
356.
72. Amphacanthidae    Teuthididae, Gthr. iii, 313-  
324.

*(Chaetodontoidea.)*

73. Toxotidae                      Squamipennes      (Toxotina),  
Gthr. ii, 66–68.
74. Chaetodontidae              Squamipennes (Chaetodonti-  
na), Gthr. ii, 1, 3–57.
75. Ehippiidae                      Squamipennes (Chaetodonti-  
na), Gthr. ii, 1, 57–62.

*(Scombroidea.)*

76. Xiphiidae                      Xiphiidae, Gthr. ii, 511–  
512.
77. Trichiuridae                      Lepturoidae, Gill, P. A. N. S. Ph.,  
1863, 224. (G. ii, 342–349.)
78. Scombridae                      Scombridae, Gill, P. A. N. S. Ph.,  
1862, 124. (G. ii, 349–373.)
79. Carangidae                      Carangidae, Gill, P. A. N. S. Ph.,  
1862, 430. (G. ii, 419–485.)
80. Drepanidae                      Squamipennes      (Drepane),  
Gthr. ii, 1, 62.
81. Coryphaenidae                      Scombridae      (Coryphaenina  
pt), Gthr. ii, 404.
82. Nematistiidae                      Nematistiidae, Gill, P. A. N.  
S. Phil., 1862, 258.
83. Stromateidae                      Scombridae      (Stromateina),  
Gthr. ii, 397–404.
84. Zenidae                      Zenidae, Gill, P. A. N. S. Phil.,  
1862, 126. (G. ii, 393–396.)

- |                   |  |
|-------------------|--|
| 85. Pteraclididae | Scombridae (Coryphaenina),<br>Gthr. ii, 410. |
| 86. Bramidae      | Scombridae (Coryphaenina),<br>Gthr. ii, 408. |
| 87. Lamprididae   | Scombridae (Coryphaenina),<br>Gthr. ii, 415. |
| 88. Dianidae      | Scombridae (Coryphaenina),<br>Gthr. ii, 413. |
| 89. Kurtidae      | Carangidae (Kurtina), Gthr.<br>ii, 508-510.  |
| 90. Capridae      | Carangidae (Carangina), Gthr.<br>ii, 495.    |
| 91. Nomeidae      | Scombridae (Nomeina), Gthr.<br>ii, 387.      |

(*Sillaginoidea.*)

- |                     |  |
|---------------------|--|
| 92. Sillaginidae    | Sillaginoidae, Gill, P. A. N. S.<br>Phil., 1861, 501-507.          |
| 93. Chaenichthyidae | Chaenichthyoidae, Gill, P. A.<br>N. S. Phil., 1861, 507-510.       |
| 94. Harpagiferidae  | Harpagiferoidae, Gill, P. A. N.<br>S. Phil., 1861, 510-512.        |
| 95. Nototheniidae   | Notothenioidae, Gill, P. A. N.<br>S. Phil., 1861, 512-522.         |
| 96. Bovichthyidae   | Bovichthyoidae, Gill, P. A. N.<br>S. Ph., 1861, 514. (G. ii, 225.) |
| 97. Latilidae       | Latiloidae, Gill, P. A. N. S. Ph.,<br>1861, 514. (G. ii, 359-361.) |

- (*Polymixoidea.*)

- (*Berycoidea*.)

101. Berycidae                      Berycidae, Gthr. i, 8 (12-50).

(Sciaenoidea.)

102. Sciaenidae                  Sciaenidae, Gthr. ii, 265-  
    318.

(*Percoidea.*)

- |                      |  |
|----------------------|--|
| 103. Sparidae        | Sparidae (Cantharina, Sargina,<br>Pagrina), Gthr. i, 412.  |
| 104. Pimelepteridae  | Sparidae (Pimelepterina),<br>Gthr. i, 497.                 |
| 105. Maenididae      | Pristipomatidae, Gthr. i, 272.<br>(In part.)               |
| 106. Pristipomatidae | Pristipomatidae, Gthr. i, 272.<br>(In part.)               |
| 107. Centrarchidae   | Centrarchoidae, Gill, Am. J. S.<br>& A., (2s), xxxvii, 92. |



108. Serranidae Percidae (Serranina), Gthr. i,  
51, 81.
109. Percidae Percidae (Percina), Gthr. i,  
51, 58.
110. Centropomidae Percidae (Centropomus), Gthr.  
i, 51, 79.

(*Physoclysti incertae sedis.*)

(*Pegasoidea.*)

111. Pegasidae Pegasidae, Gthr. viii, 146-  
149.

(*Priacanthoidea.*)

112. Priacanthidae Percidae (Priacanthina), Gthr.  
i, 215.

(*Hoplegnathoidea.*)

113. Hoplegnathidae Hoplegnathidae, Gthr. iii,  
357-358.

(*Nandidae* Gthr.)

114. Nandidae Nandidae (Nandina), Gthr. iii,  
362, 367-369.

115. Plesiopidae Nandidae (Plesiopina), Gthr.  
iii, 362, 363-366.

(*Polycentridae.*)

116. Polycentridae Polycentridae, Gthr. iii, 370-  
371.

(*Cirrhitidae.*)

117. Cirrhitidae Cirrhitidae, Gill, P. A. N. S.  
Phil., 1862, 102-124.

(*Acanthopterygii*, § ii, Gthr.)

118. Aphredoderidae    Aphredoderidae,    Gthr.    i,  
271.

(*Sphyraenoidea*.)

119. Sphyraenidae    Sphyraenidae, Gthr. ii, 334–  
341.

(*Echeneidoidea*.)

120. Echeneididae    Scombridae (*Echeneis*), Gthr.  
ii, 354, 376–385.

(*Oxudercidae*.)

121. Oxudercidae    Oxudercidae,    Gthr.    iii,  
165.

(*Comephoridae*.)

122. Comephoridae    Comephoridae,    Gthr.    iii,  
299.

(*Acanthopterygii*, § iv, Gthr.)

123. Trachypteridae    Trachypteridae, Gthr. iii, 300–  
311.

(*Acanthopterygii*, § iii, Gthr.)

124. Lophotidae    Lophotidae, Gthr. iii, 312.

(*Luciocephalidae*.)

125. Luciocephalidae    Luciocephalidae,    Gthr.    iii,  
390.

(*Acanthopterygii channiformes*, Gthr.)

126. Ophiocephalidae      Ophiocephalidae, Gthr. iii,  
468–483.

(*Acanthopterygii blenniiformes*, § ii, Gthr.)

127. Trichonotidae      Trichonotidae, Gthr. iii, 484–  
485.

(*Acanthopterygii blenniiformes*, § i, Gthr.)

128. Cepolidae      Cepolidae, Gthr. iii, 486–  
489.

(*Acanthopterygii gobiesociformes*, § ii, Gthr.)

129. Psychrolutidae      Psychrolutidae, Gthr. iii, 516–  
517.

#### PERCESOCES.

(Cope, Tr. Am. Phil. Soc., xiv, 456, 457.)

130. Atherinidae      Atherinidae (Atherinina),  
Gthr. iii, 391, 392–406.  
131. Tetragonuridae      Atherinidae (Tetragonurina),  
Gthr. iii, 391, 407.  
132. Mugilidae      Mugilidae, Gthr. iii, 409–  
467.

#### HEMIBRANCHI.

(Cope, Tr. Am. Phil. Soc., xiv, 456, 457.)

(*H. Gasterosteiformes*.)

(*Gasterosteoides*.)

133. Gasterosteidae      Gasterosteidae,    Gthr.    i,  
1-7.

134. Aulorhynchidae    Aulorhynchoidae, Gill, P. A.  
N. S., Phil., 1862, 233.

(*Aulostomoidea.*)

135. Aulostomidae      Fistulariidae, Gthr. iii, 529,  
535-538.

136. Fistulariidae      Fistulariidae, Gthr. iii, 529-  
534.

(*H. Centrisciformes.*)

137. Centriscidae      Centriscidae Gthr. iii, 518-  
524.

138. Amphisilidae      Centriscidae, Gthr. iii, 518,  
524-527.

SYNENTOGNATHI.

139. Belonidae          Scomberesocidae,    Gthr.    vi,  
233, 234-256.

140. Scomberesocidae    Scomberesocidae,    Gthr.    vi,  
233, 256-298.

HAPLOMI.

(Cope, Tr. Am. Phil. Soc., xiv, 452, 455.)

(*Amblyopoidea.*)

141. Amblyopidae      Heteropygii, Gthr. vii, 1-2;  
Putn., Am. Nat., vi, 6-30.

*(Cyprinodontoidea.)*

142. Esocidae                      Esocidae, Gthr. vi, 226-230.
143. Umbridae                    Umbridae, Gthr. vi, 231-232.
144. Cyprinodontidae          Cyprinodontidae, Gthr. vi, 299-356.

## ISOSPONDYLI.

(Cope, Tr. Am. Phil. Soc., xiv, 452, 454.)

145. Characinidae                Characinidae, Gthr. v, 278-380.
146. Percopsidae                Percopsidae, Gthr. vi, 207.
147. Haplochitonidae          Haplochitonidae, Gthr. v, 381-382.
148. Galaxiidae                 Galaxiidae, Gthr. vi, 208-213.
149. Osteoglossidae            Osteoglossidae, Gthr. vii, 377-380.
150. Notopteridae               Notopteridae, Gthr. vii, 478-481.
151. Halosauridae               Halosauridae, Gthr. vii, 482.
152. Chauliodontidae            Sternoptychidae (Chauliodontina), Gthr. v, 383, 391-392.
153. Sternoptychidae           Sternoptychidae (—), Gthr. v, 383.

154. Stomiatidae      Stomiatidae, Gthr. v, 424–428.
155. Scopelidae      Scopelidae (Saurina), Gthr. v, 393, 404–417.
156. Aulopidae      Aulopidae, Cope, Tr. Am. Phil. Soc., xiv, 455. (G. v, 393, 402.)
157. Synodontidae      Scopelidae (Saurina), Gthr. v, 393, 394–404.
158. Microstomidae      Coregonidae, Cope, Tr. Am. Ph. Soc., xiv, 455. (G. vi, 1.)
159. Salmonidae      Salmonidae, Cope, Tr. Am. Ph. Soc., xiv, 455. (G. vi, 1.)
160. Salangidae      Salmonidae (Salangina), G. vi, 1, 205.

*(Paralepidoidea.)*

161. Alepidosauridae      Scopelidae (Alepidosaurina), Gthr. v, 393, 420–423.
162. Paralepididae      Scopelidae (Paralepidina), Gthr. v, 393, 418–420.

*(Alepocephalidae.)*

163. Alepocephalidae      Alepocephalidae, Gthr. vii, 477.

*(Gonorhynchidae.)*

164. Gonorhynchidae      Gonorhynchidae, Gthr. vii, 373.

*(Hyodontidae.)*

165. Hyodontidae      Hyodontidae,      Gthr.      vii,  
375.

*(Clupeidae.)*

166. Albulidae      Clupeidae (Albulina),      Gthr.  
vii, 381, 468.
167. Elopidae      Clupeidae (Elopina),      Gthr. vii,  
381, 469.
168. Chanoidae      Clupeidae (Chanina),      Gthr.  
vii, 381, 473.
169. Dussumieridae      Clupeidae (Dussumieriina),  
Gthr. vii, 381, 464.
170. Clupeidae      Clupeidae (Clupeina),      Gthr.  
vii, 381, 412.
171. Dorosomidae      Clupeidae (Chatoessina),      Gthr.  
vii, 381, 406.
172. Engraulididae      Clupeidae (Engraulina),      Gthr.  
vii, 381, 383.

*(Chirocentridae.)*

173. Chirocentridae      Chirocentridae,      Gthr. vii, 475–  
476.

## EVENTOGNATHI.

174. Catastomidae      Cyprinidae (Catastomina),  
Gthr. vii, 3, 12, 24.
175. Cyprinidae      Cyprinidae,      Gthr. vii, 3, 25–  
339.

176. Cobitidae            Cyprinidae (Cobitina), Gthr.  
vii, 3, 344.
177. Homalopteridae    Cyprinidae (Homalopterina),  
Gthr. vii, 3, 340-343:
178. Kneriidae           Kneriidae, Gthr. vii, 371-  
372.

## GYMNONOTI.

(*Glanencheli*, Cope, Tr. Am. Phil. Soc., xiv, 455.)

179. Sternopygidae    Sternopygidae, Cope, Tr. Am.  
Ph. Soc., xiv, 455. (G. viii, 1.)
180. Electrophoridae   Gymnotidae, Cope, Tr. Am.  
Ph. Soc., xiv, 455. (G. viii, 1.)

## SCYPHOPHORI.

(Cope, Tr. Am. Phil. Soc., xiv, 455.)

181. Mormyridae        Mormyridae, Gthr. vi, 214-  
224.
182. Gymnarchidae     Gymnarchidae,    Gthr.    vi,  
225.

## NEMATOGNATHI.

(*Hypophthalmidae*, Cope.)

183. Hypophthalmidae Hypophthalmidae, Cope, op.  
cit. xiv, 454. (G. v, 66-68.)

(*Siluridae*, Cope.)

184. Trichomycteridae Siluridae (Opisthopterae), G.  
v, 1, 272-277.



185. Siluridae                      Siluridae (—), Gthr. v, 1, 30–65, 69–220.
186. Chacidae                     Siluridae (Chacina), Gthr. v, 1, 29.
187. Plotosidae                  Siluridae (Plotosina), Gthr. v, 1, 23–27.
188. Clariidae                    Siluridae (Clarina), Gthr. v, 1, 13–23.
189. Callichthyidae            Siluridae (Hypostomatina), Gthr. v, 1, 225–230.
190. Argiidae                    Siluridae (> Hypostomatina), Gthr. v, 1, 222–225.
191. Loricariidae               Siluridae (> Hypostomatina), Gthr. v, 1, 230–265.
192. Sisoridae                  Siluridae (Hypostomatina), Gthr. v, 262–265.

(*Aspredinidae*, Cope.)

193. Aspredinidae              Siluridae (Aspredinina), Gthr. v, 3, 266–270.

APODES.

ICHTHYOCEPHALI.

(Cope, Tr. Am. Phil. Soc., xiv, 455.)

194. Monopteridae              Symbranchidae (Symbranchina), Gthr. viii, 12, 14.

195. Symbranchidae	Symbranchidae (Symbranchi- na), Gthr. viii, 12, 14.
196. Amphipnoidae	Symbranchidae (Amphipno- ina), Gthr. viii, 12, 13.

197. Muraenesocidae	Muraenidae (Muraenesocina), Gthr. viii, 19, 45.
198. Congridae	Muraenidae (Anguillina), Gthr. viii, 19, 23.
199. Anguillidae	Muraenidae (Anguillina), Gthr. viii, 19, 23.

200. Rataburidae            Muraenidae (Ptyobranchina),  
   Gthr. viii, 19, 90.

201. Muraenidae            Muraenidae (—), Gthr. viii,  
   19.

202. *Chilobanchidae*    *Symbranchidae* (*Chilobanchina*), Gthr. viii, 12, 17.  
203. *Nemichthyidae*    *Muraenidae* (*Nemichthyina*), Gthr. viii, 19, 21.

204. Synaphobranch- Muraenidae (Synaphobranch-  
idae ina), Gthr. viii, 19, 22.  
205. Saccopharyngidae Muraenidae (Saccopharyng-  
ina), Gthr. viii, 19, 22.

### OPISTHOMI.

(Cope, Tr. Am. Phil. Soc., xvi, 456.)

206. Mastacembelidae Mastacembelidae, Gthr. iii,  
539-543.  
207. Notacanthidae Notacanthidae, Gthr. iii, 544-  
545.

## SUB-CLASS GANOIDEI.

### SUPER-ORDER HYOGANOIDEI.

#### CYCLOGANOIDEI.

208. Amiidae Amiidae, Gthr. viii, 324-  
325.

#### RHOMBOGANOIDEI.

209. Lepidosteidae Lepidosteidae, Gthr. viii, 328-  
331.

### SUPER-ORDER BRACHIOGANOIDEI.

#### CROSSOPTERYGLA.

210. Polypteridae Polypteridae, Gthr. viii, 326-  
328.

## SUPER-ORDER DIPNOI.

## SIRENOIDEI.

211. *Lepidosirenidae*      *Sirenoidei*, Gthr. viii, 321–323.
- 212. *Ceratodontidae*      *Sirenidae* (*Ceratodontina*),  
Gthr. Ph. Trans. R. S. 1871,  
554.

## SUPER-ORDER CHONDROGANOIDEI.

## SELACHOSTOMI.

213. *Polyodontidae*      *Polyodontidae*, Gthr. viii, 346–347.

## CHONDROSTEI.

214. *Acipenseridae*      *Acipenseridae*, Gthr. viii, 332–345.

## SUB-CLASS ELASMOBRANCHII.

## SUPER-ORDER HOLOCEPHALI.

## HOLOCEPHALI.

215. *Chimaeridae*      *Chimaeridae*, Gthr. viii, 349–352.

## SUPER-ORDER PLAGIOSTOMI.

## RAIAE.

## MASTICURA.

216. *Myliobatidae*      *Myliobatidae* (*Myliobatina*),  
Gthr. viii, 488–495.

217. Cephalopteridae    Myliobatidae (Ceratopterina),  
Gthr. viii, 488, 496-498.
218. Trygonidae        Trygonidae, Gthr. viii, 471-  
488.

## PACHYURA.

219. Torpedinidae      Torpedinidae, Gthr. viii, 448-  
455.
220. Raiidae            Raiidae, Gthr. viii, 455-  
471.
221. Rhinobatidae      Rhinobatidae, Gthr. viii, 440,  
441-448.
222. Rhamphobatidae   Rhinobatidae, Gthr. viii, 440,  
440-441.
223. Pristidae          Pristidae, Gthr. viii, 436-  
439.

## SQUALI.

## RHINAE.

224. Squatinidae       Rhinidae, Gthr. viii, 430-  
431.

## GALEI.

225. Heterodontidae    Cestraciontidae, Gthr. viii,  
415-416.
226. Notidanidae        Notidanidae, Gthr. viii, 397-  
399.

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|-------------------------|--|
| 227. Rhinodontidae      | Rhinodontidae, Gthr. viii, 396.                          |
| 228. Cetorhinidae       | Lamnidae (Selachina), Gthr. viii, 389, 394.              |
| 229. Lamnidae           | Lamnidae (Lamnina), Gthr. viii, 389, 389-392.            |
| 230. Odontaspididae     | Lamnidae (Lamnina), Gthr. viii, 389, 392-393.            |
| 231. Alopeciidae        | Lamnidae (Lamnina), Gthr. viii, 389, 393-394.            |
| 232. Sphyrnidae         | Carchariidae (Zygaenina), Gthr. viii, 357, 380-383.      |
| 233. Galeorhinidae      | Carchariidae (Carchariina, Mustelina), G. viii, 357-388. |
| 234. Scylliidae         | Scylliidae, Gthr. vi, 400-413.                           |
| 235. Ginglymostomatidae | Scylliidae, Gthr. vi, 400, 407-409.                      |
| 236. Crossorhinidae     | Scylliidae, Gthr. vi, 400, 413-414.                      |
| 237. Spinacidae         | Spinacidae, Gthr. vi, 417, 418-425.                      |
| 238. Scymnidae          | Spinacidae, Gthr. vi, 417, 425-429.                      |
| 239. Oxynotidae         | Spinacidae, Gthr. vi, 417, 417.                          |
| 240. Pristiophoridae    | Pristiophoridae, Gthr. vi, 431-433.                      |

## CLASS MARSIPOBRANCHII.

### HYPEROARTIA.

241. Petromyzontidae    Petromyzontidae, Gthr. viii,  
499-509.

### HYPEROTRETI.

242. Myxinidae            Myxinidae, Gthr. viii, 510,  
510-511.
243. Bdellostomidae    Myxinidae, Gthr. viii, 510,  
511-512.

## CLASS LEPTOCARDII.

### CIRROSTOMI.

244. Branchiostomidae · Cirrostomi, Gthr. viii, 513-  
514.





## BIBLIOGRAPHY.

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SUBJOINED is a synopsis of the great standard works of descriptive ichthyology, which will give information as to the extent, price, etc., of the works in question, and also some idea respecting the classifications adopted by their authors. The information may be considered as a response to inquiries often made respecting such subjects.

The work of Cuvier and Valenciennes was never completed, and, as will be perceived from the enumeration of contents, included only the Acanthopterygian and Physostome Teleosts, and incidentally the Amioids whose relations were not recognized by Valenciennes. Cuvier only contributed the introduction and monographs of families to the first ten volumes, his death having taken place in the year 1832. Valenciennes only is responsible for the rest of the work.

The work of Duméril may be considered as a complement to that of Cuvier and Valenciennes. The death of the author has arrested the further progress of the work.

The work of Dr. Günther is the only complete repertory of the species of fishes published, and, from its cheapness, the most available; it is also subsequent to both the preceding, and therefore in a certain degree supersedes them. No general index has been published yet, but one is promised in connection with an appendix bringing the subject up to date, if circumstances permit.

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In order, further, to give some idea of the progress of Ichthyology, the titles are given of all the compilations professing to describe the species of fishes known at the periods of their respective publication. These compilations are valuable, however, only to the historian of Ichthyology, and are worse than useless to any except an expert in the science.

1738.

**ARTEDI (Peter).** Petri Artedi Sueci, Medici, Ichthyologia sive opera omnia de Piscibus scilicet: Bibliotheca Ichthyologica. Philosophia Ichthyologica. Genera Piscium. Synonymia Piscium. Descriptiones Specierum—Omnia in hoc opere perfectiora, quam antea ulla. Posthuma Vindicavit, Recognovit, Coaptavit et Edidit Carolus Linnæus, Med. Doct. & Ac. Imper. N. C.—Lugduni Batavorum, Apud Conradum Wishoff. 1738. [8vo., five parts, viz:—

[v. 1.] Petri Artedi Angermannia-Sueci Bibliotheca Ichthyologica seu Historia Litteraria Ichthyologiæ in qua Recensio fit Auctorum, qui de Piscibus scripsere, librorum titulis, loco & editionis tempore, additis judicis, quid quivis Auctor præstiterit, quali method et successu scripserit, disposita secundum sæcula in quibus quisque auctor floruit. Ichthyologiæ Pars I.—Lugdunum Batavorum, Apud Conradum Wishoff. 1738. [iv, 66, 2 pp.]

[v. 2.] Petri Artedi Sueci Philosophia Ichthyologica in qua quicquid fundamenta Artis absolvit: Characterum solloet *Genericorum, Differentiarum specificarum, Varietatum et Nominum Theoria* rationibus demonstratur, et exemplis comprobatur. Ichthyologiae Pars II.—Lugduni Batavorum, Apud Conradum Wishoff. 1738. [iv, 92 pp.]

[v. 3.] Petri Artedi Sueci Genera Piscium. In quibus Systema totum Ichthyologiae proponitur cum Classibus, Ordinibus, Generum Characteribus, Specierum Differentiis, Observationibus plurimis. Redactis Speciebus 242 ad Genera 52. Ichthyologia Pars III.—Lugduni Batavorum, Apud Conradum Wishoff. 1738. [iv, 88 pp.]

[v. 4.] Petri Artedi Angermannia-Sueci Synonymia Piscium fere omnium; in qua recensio fit Nominum Piscium, omnium facile Authorum, qui umquam de Piscibus scripsere: uti *Graecorum, Romanorum, Barbarorum*, nec non omnium insequentium *Ichthyologorum* una cum Nominibus *Inquilinis* variarum nationum. *Opus sine pari.* Ichthyologiae Pars IV.—Lugduni Batavorum, Apud Conradum Wishoff. 1738. [iv, 118, 22 pp.]

[v. 5.] Petri Artedi Sueci Descriptiones Specierum Piscium quos vivos praesertim dissecuit et examinavit, inter quos primario Pisces Regni Sueciae facile omnes accuratissime describuntur cum non paucis aliis exoticis. Ichthyologiae Pars V.—Lugduni Batavorum, Apud Conradum Wishoff. 1738. [iv, 102 pp.]

As indicated in the title of the "Genera Piscium" (v. 3), Artedi admitted into the system 242 nominal species under 52 genera, but in this number are included the Cetaceans, which were regarded as constituting an order of fishes named *Plaguri*: these being eliminated (14 species representing 7 genera), the number is reduced to 228 species and 45 genera,—to these, however, may be added 13 other genera indicated by him,—5 in the supplement to the "Genera Piscium," and 8 in the "Synonymia Piscium."

Artedi may be justly regarded as the father of modern Ichthyology, having introduced a precise terminology, full and pertinent diagnoses, and throughout uninominal generic names. He first introduced consideration of the number of branchiostegal rays for distinctions of genera, etc. He distributed the true fishes into the orders *Malacopterygii* (= *Malacopterygii* Cuv. + *Syngnathus, Stromateus, Anarrhicas*), *Acanthopterygii* (= *Acanthopterygii* Cuv.), founded on the real or supposed structure of the fins, *Branchiostegii* (a heterogeneous group based on erroneous ideas), and *Chondropterygii* (= *Chondropterygii* Cuv.)

The edition of the *Genera Piscium* published by Walbaum (1792) will be noticed under the name of the editor who made the work the vehicle of a new compilation of specific descriptions.

1740-1749.

**KLEIN (Jacob Theodor).** [1.] *Iacobi Theodori Klein Historiæ Piscium Naturalis promovendæ missus primus de lapillis eorumque numero in craniis piscium, cum præfatione: de piscium auditu. Accesserunt I. Anatome Tursionum. II. Observata in capite Raim.*—[Motto]. Cum figuris.—Gedani, Litteris Schreiberianis. 1740. [4to., 1 p. l., 36 pp., 6 tab.]

—[2.] *Iacobi Theodori Klein Historiæ Piscium Naturalis promovendæ missus secundus de Piscibus per pulmonibus spirantibus [Cete] ad iustum numerum*

et ordinem redigendis.—Accesserunt singularia: de I. Dentibus Balænarum et Elephantinis. II. Lapide Manati et Tiburonis.—[Motto]. Cum figuris.—Gedani, Litteris Schreiberianis. 1741. [4to., 3 p. l., 38 pp., 1 l., 6 tab.]

—[3.] Jacobi Theodori Klein Historiæ Piscium Naturalis promovendæ missus tertius de Piscibus per branchias occultas spirantibus ad justum numerum et ordinem redigendis. Cum observationibus circa partes genitales Rajæ maris, et ovarium Galei. [Motto]. Cum figuris.—Gedani, Litteris Schreiberianis. 1742. [4to., 2 p. l., 48 pp., 7 tab.]

—[4.] Jacobi Theodori Klein Historiæ Piscium Naturalis promovendæ missus quartus de piscibus per branchias apertas spirantibus ad justum numerum et ordinem redigendis. Horum series prima cum additamento ad missum tertium. [Motto]. Cum figuris.—Lipsiæ; prostat apud Jo. Frid. Gleditschium ubi & reliqua autoris opuscula. Gedani, Typis Schreiberianis. 1744. [4to., 3 p. l., 68 pp., 15 tab.]

—[5.] Jacobi Theodori Klein Historiæ Piscium Naturalis promovendæ missus quintus et ultimus de piscibus per branchias apertas spirantibus. Horum series secunda cum additionibus ad missus II, III, IV, et Epistola: de cornu piscis carinæ navis impacto. [Motto]. Cum figuris.—Gedani, Litteris Schreiberianis. 1749. [4to., 2 p. l., 102 pp., 1 l., 20 tab.]

A remarkable work. It perhaps surpasses all other ichthyological publications in incongruities between the definitions of groups and the contents thereof, and it is difficult to conceive how some could have originated. The definitions themselves are sufficiently clear, and their practical application to forms would not appear to be difficult: the author however seems to have practically ignored his definitions of groups when once framed, and to have proceeded, as some more modern naturalists have done, by successive approximations of other forms to the types of his definitions, and without checking the results by subsequent comparison with the latter. Judging from the character of his various works, his analytical powers appear to have been tolerably fair, but those of synthesis very defective; this defect, an overwhelming exclusiveness of attention to the special subject or idea for the moment under consideration, and a neglect to verify the results afterwards by comparison of all the elements, vitiated his entire work: in addition, he appears to have labored under the disadvantage of an extremely limited autoptical acquaintance with natural objects, a certain stolidity and inaptitude for applying even that little knowledge to the interpretation of figures and descriptions,\* and an unbounded trust in the reliability and knowledge of others—except Linné. The stolidity was not sufficiently diluted with unintelligible rhetoric to be entitled profundity.

His classification is a strange one. In the first place, he distributes the fishes (including therewith the cetaceans) into primary groups distinguished (I) by lungs (Cete), or (II) by gills (a) concealed or (b) apparent from the exterior. The true fishes with concealed gills were then arranged according to the (1) position (lateral or inferior) of the branchial apertures, and (2) the larger sub-division by the presence or absence of (lateral) fins, and finally (3) by the number of branchial apertures. The fishes with externally visible gills were distributed into general groups distinguished by positive characters, and the remaining left in one marked by negative characters,—that is, into groups “notable” for some character or other (as to (1), general form; (2), snout; (3), eyes; (4), armature; (5), breast or head; (6), volubility of body),

\* For example, he often failed to consider that in symmetrical fishes the lateral fins were double, or present on both sides.

and then succeeded the residuum in which no very salient characters were developed, and whose heterogeneous contents were classified by the number of the fins. But while such was the case theoretically, practically it was quite otherwise, and fancy urged the approximation to the types of his groups of forms on account of supposed resemblances and in forgetfulness of the characters, and which, at another time, under the influence of other ideas, he had referred elsewhere. The nominal species thus scattered, in the several cases, were, however, severally derived from different sources.

A few examples need only be given in demonstration of the truth of these criticisms. The Eels and Loaches (Cobitidae), having the branchial fissures very narrow, were referred to the Fishes with concealed gills, but several species (*e. g.* Cobitidae, 3 sp.) reappear in the other section under the genus *Enchelyopus*,—the author, overlooking the character of the branchial apertures, having happened to be struck by the resemblance of such forms as were depicted by other authors to certain species for which he had more especially framed the genus: in like manner, species were duplicated under the genera *Enchelyopus* and *Callarias*, *Enchelyopus* and *Leuciscus*, and in fact, almost every other genus with numerous species contained some that had been referred elsewhere. In cases like *Mastacembelus*, *Psalisostomus*, and *Solenostomus*, distinguished—one, by the projection of the lower jaw; the second by that of the upper; and the third by the tubular snout, it might be supposed a saliency of character existed which would prevent grossly erroneous references, but it has not detained our author from referring to them species entirely opposed in character. Another mode of procedure is illustrated by the reference of forms to the group distinguished by the "eyes." This was originally suggested by the Heterosomata distinguished by the peculiarity of the two eyes on the same side, but our author has referred to the same (distinguished by the *eyes*) two combinations of species (*Rhombotides*=*Chaetodontidae* pp. and *Platiglossus*, related to *Julis*) because, although having no distinctive character whatever in the eyes, he evidently fancied a resemblance between one (*Rhombotides*) and *Rhombus* (Pleuronectidae), and the other (*Platiglossus*) and *Solea*.

The following abstract, selected from his work (Miss. v, p. 00), will give a fuller idea of his system. The incongruity of his genera prevents a comparison with modern types, except in a few cases.

PISCES	PULMONIBUS spirantes sunt <i>Physeteres</i> . [Cete.] <i>Blaser Missu II.</i>	
	BRANCHIIS	<i>Spiraculis ad latera</i> : <i>Cynocephalus</i> , <i>Galeus</i> , <i>Pristis</i> , <i>Cestraclon</i> , <i>Rhina</i> [=SQUALI]; <i>Batrachus</i> ; <i>Crayracion</i> , <i>Caprisous</i> [=PLEUROGATHI]; <i>Conger</i> , <i>Muraena</i> [=APODES]; <i>Petromyzon</i> .
	occulitis	<i>Spiraculis in thorace</i> : <i>Narcaoion</i> , <i>Rhinobatus</i> , <i>Lelobatus</i> , <i>Dasybatus</i> [=RAIAE].
	Missu III.	<i>Forma</i> : <i>Balaenæ formis</i> . Missu IV. Fasc. i. <i>Silurus</i> . <i>Rostro</i> : Fasc. ii. <i>Acipenser</i> , <i>Latargus</i> [=ANARRHICAS], <i>Xiphias</i> , <i>Mastacembelus</i> [=Belone pp.], <i>Psalisostomus</i> , <i>Solenostomus</i> [=Fistularia L. pp.], <i>Amphisilen</i> . <i>Oculis</i> . Fasc. iii. <i>Solea</i> , <i>Passer</i> , <i>Rhombus</i> , <i>Rhombotides</i> s. <i>Europus</i> , <i>Tetragonopterus</i> , <i>Platiglossus</i> . <i>Armatura</i> . Fasc. iv. <i>Cataphractus</i> [=Triglidae pp.], <i>Coristion</i> , <i>Centrisous</i> [=Gasterosteus+Centrisous]. <i>In sterno &amp; in capite</i> . Fasc. v. <i>Oncotio</i> [=Cyclopterus], <i>Rohe-neis</i> . <i>Corpore volubili</i> . Fasc. vi. <i>Enchelyopus</i> .
	BRANCHIIS	
	apertis	

sunt notabiles	Pinnis Dorsalibus. Missu V.	<p>TRIPTERUS, Fasc. vii. Callarias.</p> <p>PSEUDOTRIPTERUS, Fasc. viii. Pelamys.</p> <p>DIPTERUS, Fasc. ix. Trutta, Mullus, Cestrens, Lobrax, Sphyraena, Gobio, Asperulus, Aspredo, Trichidion.</p> <p>PSEUDODIPTERUS, Fasc. x. Glaucus, Blennus.</p> <p>MONOPTERUS, Fasc. xi. Perca, Perois, Moenas, Cici, Synagris, Hippurus, Sargus, Cyprinus, Prochilus, Brama [=Abramis], Mystus, Leuciscus, Harengus, Lucius.</p> <p>PSEUDOMONOPTERUS, Fasc. xii. Pseudopterus [=Pterois.]</p>
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518 nominal species (exclusive of the Cetaceans) were described under 61 genera, 127 being fishes with concealed gills, 177 having apparent gills and some "notable" feature, and 214 with apparent gills and without notable features.

(1735) 1748-1768.

**LINNÉ** (Carl von). [1.] Caroli Linnæi, Sveci, Doctoris Medicinæ, Systema Naturæ, sive Regna tria naturæ systematicè proposita per classes, ordines, genera, & species.—O Jehova! quam ampla sunt opera Tua! | Quam ea omnia sapienter fecisti! | Quam plena est terra possessione tua! | *Psalm.* civ. 24. | — Lugduni Batavorum, Apud Theodorum Haak. 1735. Ex Typographia Joannis Wilhelmi de Groot. [Fol., 7 l. unnumbered and unpagd.]

145 species of fishes are enumerated under 36 genera, besides 10 species of Plagiuri (Cete).

The only copy of the original edition, whose existence in the United States is known to me, is in the library of J. Carson Brevoort, Esq., of Brooklyn.

The *third edition*, published in Latin and German by J. J. Lange, at Halle, in 1740, is a reprint of the first.

A textual reprint of the first edition was also published in 1831, viz:—*Editio prima reedita*, curante Antonio-Laurentio-Apollinario Fée, Pharm. Primar. in Schola Medic. Militar. Insulensi; Botanic. Professore. Academ. Medic. Reg. Socio, etc. [Psalm]—Parisii, Apud F. G. Levrault, Bibliopolam, via dicta De La Harpe, n. 81. Atque Argentoratii, via dicta Des Juifs, n. 33. 1830. [8vo., 2 p. l., vi, 81 pp., 1 l.]

—[2.] Caroli Linnæi Naturæ Curiosorum *Dioscoridis Secundi* Systema Naturæ in quo naturæ regna tria, secundum.[1] Classes, Ordines, Genera, Species, systematicè proponuntur. *Editio Secunda, Auctior*.—Stockholmie | Apud Gottfr. Kiese-wetter. 1740. [8vo., 2 p. l., 80 pp.]

182 species of Fishes are enumerated under 44 genera (88 to 131), besides 8 species of Plagiuri (Cete) under 5 genera.

The *fifth edition* is a reprint of the second, and was published by M. G. Agnethler, at Halle, in 1747 (8vo., 88 pp.); it contains the German names.

—[3.] Caroli Linnæi Medic. & Botan. in Acad. Upsaliensi Professoris Acad. Imperialis, Upsaliensis, Stockholmensis & Monspeliensis Soc. Systema Naturæ in quo proponuntur naturæ regni tria secundum Classes, Ordines, Genera & Species. *Editio quarta ab Auctore emendata & aucta*. Accesserunt nomina Gallica.—Parisii, Sumptibus Michaelis-Antonii David, bibliopolæ, via Jacobæ, sub signo

*Calami auri.* 1744. Cum privilegio regis. [8vo., 3 p. l. [*Fundamenta Botanica*] xxvii, [1,] 108 pp., tab.]

This is said, by Linné, to have been edited by B. Jussieu, and to be the same as the second edition ("per B. Jussieum. Adjecta nomina Gallica. idem cum 2<sup>o</sup>"). It contains however, in addition to the "*Fundamenta Botanica*," a special introduction (by himself), which concludes with the remark that it is the *fourth* edition, revised and enlarged (*Jam quartam castigatam iterum auctamque Lectori offero Benevolo.*—p. 3).

238 nominal species of Fishes are enumerated under 48 genera (85 to 129), in addition to the Cetaceans (8 species under 5 genera).

In this edition (and certainly not in the second, as stated by Cuvier), the rays in the fins were also first given for each species.

—[4.] Caroli Linnæi Archiater. Reg. Med. et Bot. Profess. Upsal. *Systema Naturæ sistens Regna Triâ Naturæ, in Classes et Ordines Genera et Species redacta tabulisque æneis illustrata.* Cum Privilegio S. R. M. Svecicæ & S. R. M. Poloniæ ac Electoris Saxon. *Editio sexta, emendata et aucta.*—Stockholmæ. Impensis Godofr. Klesewetteri 1748. [8vo., iv, 224 pp., 2 p. l., 14 l., 7 pl.]

281 nominal species of Fishes are enumerated, representing 47 genera (102 to 146), and 12 Plaguri (Cete) representing 6 genera.

The *seventh* edition, published at Leipzig (Lipsiæ) in 1748, is a textual reprint of the sixth (*Secundum sextam Stockholmiensem emendatam & auctam editionem*), by the same publisher, but with the German popular names instead of Swedish.

The *eighth* edition contains the Vegetable Kingdom only.

—[5.] Caroli Linnæi Archiater. Reg. Med. et Botan. Profess. Upsal. *Systema Naturæ sistens Regna Triâ Naturæ in Classes et Ordines Genera et Species redacta tabulisque æneis illustrata.* Accedunt vocabula Gallica. *Editio multo auctior & emendatior.*—Lugduni Batavorum, Apud Theodorum Haak, 1756. [8vo., 4 p. l., 227 [+1] pp. [Index], 9 l., 8 pl., with 4 l. explan.]

This edition is recognized by Linné as the *ninth*, and said to have been edited by Gronovius, and to be the same as the sixth, with very few additions respecting the Birds and Fishes. ("Per Gronovium. Paucissima de Avibus, Piscibus, idem cum 6.") There is, however, a special address to the reader ("*Lectori*") from the author, in which he acknowledges to have followed the system introduced by Gronovius in the "*Museum Ichthyologicum*," the first volume of which appeared in 1754 ("*Ichthyologiam vero secundum Membranas Branchiostegas & pinnarum radios compendiose tali ordine proposui quali exstat in Gronovii Museo Ichthyologico, cujus nova detecta Genera huc intropdxi*"). And on comparison, it is found that the sequence of the genera is altogether different from that in the sixth edition, and essentially similar to the one followed by Gronovius: it differs in the following respects:—the sequence of orders is reversed, and the Plaguri added as the first order; the Chondropterygii different; the sequence in the genera of orders (III) Branchiostegi and (V) Malacopterygii reversed; and the following additional genera incorporated, viz:—113, *Gobius* and 114, *Xiphias* between 112, *Blennius* and 115, *Scomber*; 113, *Ophidion*\* as the last genus of Acanthopterygii; 144, *Stromateus*, in Malacopterygii, between 143,

\* I have demonstrated, in my memoir on the Affinities of several doubtful British Fishes (<Proc. Acad. Nat. Sc., Phila., 1861, p. 198, &c.), that *Ophidion* was originally based on the Gunnell (*Muraenoides* Lac.), and that the *Ophidium imberbe* of Montagu (not Pennant or Lacépède) is the same species.

*Anarrhicas* and 146, *Pleuronectes*, and 147, *Coryphaena* between 146, *Ammodytes* and 148, *Echensia*.

286 species of Fishes are enumerated under 58 genera (102 to 159), exclusive of the 13 species of Cetaceans.

—[6.] Caroli Linnaei Equitis De Stella Polari, Archiatri Regii, Med. et Botan. Profess. Upsal.; Acad. Upsal. Holmens. Petropol. Berol. Imper. Lond. Monspel. Tolos. Florent. Soc. Systema Naturae per Regna Tria Naturae, secundum Classes, Ordines, Genera, Species, cum Characteribus, Differentiis, Synonymis, Locis.—*Editio Decima, Reformata*. Cum Privilegio S:ae R:ae M:tis Sueciae.—Holmiae, Impensis Direct. Laurentii Salvii. 1758 [—] 1759. 8vo., 2 v., viz:—

Tomus I. [Regnum Animale.] 2 p. l., pp. 1–824. 1758.

Tomus II. [Regnum Vegetabile.] 2 p. l., pp. 825–1384. 1759.

In this edition, the binomial system, previously employed by him in the work entitled *Museum Tessinianum* (1753), was extended in its application to all the kingdoms of nature; the Artedean classification of fishes, adopted in the earlier editions, was superseded by the familiar Linnæan system, and the cetaceans were for the first time eliminated from the class of fishes and grouped with the viviparous quadrupeds under the new class name *Mammalia*.

A modification of far less merit was the separation of the *Chondropterygii* of Artedi (exclusive of the genus *Acipenser*) and their combination, under the distinctive term *Amphibia Nantes*, with the Reptiles. The Fishes thus restricted were distributed into groups distinguished by the supposed structure of the branchiæ (*Branchiostegi*), the want of fins (*Apodes*), or their presence under the throat (*Jugulares*), at the thorax (*Thoracici*), or behind (*Abdominales*).

414 species of Fishes (including the *Amphibia Nantes*) were admitted and arranged under 57 genera.

This edition was reproduced at Halle (Hals Magdeburgicæ, Typis et Sumptibus Io. Iac. Cvr. 1760), in an exact reprint (*Præfatus est Ioannes Ioachimvs Langivs*), in 1760, but has not been acknowledged as one of the so-called editions.

The recognized *eleventh* edition was published at Leipzig in 1762, and is also a reprint of the tenth, but was condemned by Linné (*Furtim prodit vitiosa. Nil additum*).

—[7.] Caroli a Linné, Equitis Aur. de Stella Polari, Archiatri Regii, Med. & Botan. Profess. Upsal., Acad. Paris. Upsal. Holmens. Petropol. Berol. Imper. Lond. Angl. Monspel. Tolos. Florent. Edinb. Bern. Soc. Systema Naturae per Regna Tria Naturae, secundum Classes, Ordines, Genera, Species, cum Characteribus, Differentiis, Synonymis, Locis. Tomus I[–] III.—*Editio Duodecima, Reformata*. Cum Privilegio S:ae R:ae M:tis Sueciae & Electoris Saxon.—Holmiae, Impens. Direct. Laurentii Salvii, 1766 [–] 1768. [8vo., 3 v., viz:—

Tomus I. [Regnum Animale.—Pars 1: *Mammalia*. *Aves*. *Amphibia*. *Pisces*. pp. 1–532. 1766. Pars 2: *Insecta*. *Vermes*. 1 p. l., pp. 533–1323, 11 l. 1767.]

Tomus II. [Regnum Vegetabile. 736 pp., 8 l.] 1767.

“ III. [Regnum Lapideum.—Appendix Animalium. Appendix Vegetabilium. 236 pp., 10 l. 3 pl. folded.] 1768.

The last edition published by Linné.

The class *Pisces* was in this edition further restricted by the exclusion of the *Branchiostegi* of Artedi (including the dismembered genera *Tetrodon* and *Diodon*), and the genera *Centricus*, *Syngnathus*, and *Pegasus* from the Fishes and their conjunction

with the forms ejected in the tenth edition and the combination of all under the *Amphibia Nantes*, which were subdivided into two groups distinguished by the separated branchial chambers (*Spiraculis compositis*) or single apertures (*Spiraculis solitariis*).

477 nominal species of Fishes (including the *Amphibia Nantes*) were described, and referred to 61 genera. The additional genera were *Amia*, *Elops* (both founded for fishes sent by Dr. Garden from South Carolina), *Cepola*, and *Teuthis*.

In conclusion, it may be said that the original editions recognized by Linné as completely revised ones were the *first* (1735), the *second* (1740), the *sixth* (1748), the *tenth* (1758), and the *twelfth* (1766-68).

The *first* was reprinted at Halle, in 1740, and the reprint recognized as the *third*; and again at Paris in 1830.

The *second* was reprinted at Paris, in 1744 (with modifications), as the *fourth* edition; and at Halle, in 1747, and the reissue was subsequently recognized as the *fifth* edition.

The *sixth* edition was reissued at Leipzig, and subsequently known as the *seventh*; and closely followed in the edition of Leipzig, recognized as the *ninth*.

The *eighth* edition did not contain the Animal Kingdom.

The *tenth* edition was reproduced at Halle in 1760 (not recognized), and at Leipzig in 1762, the last being acknowledged as the *eleventh*.

The *twelfth* edition was reprinted at Vienna, in 1767-70, and entitled the *thirteenth*, but is not esteemed as one of the regular current editions.

The later *thirteenth* edition, in which Gmelin brought together descriptions of species unrecognized by Linné and unknown to him, is noticed under the editor's name (1788).

1770.

**GOÜAN (Antoine).** *Historia Piscium, sistens ipsorum Anatomen externam, internam, atque Genera in Classes & Ordines redacta. Accedunt Vocabularium locupletissimum, Indices latini ac gallici, Experimenta circa Motum natatorium & muscularem, Respirationis mechanismum, Auditus & Generationis organa. Cum iconibus Genera nova ac præcipuas partes Anatomicas exhibentibus.* Auctore Antonio Goüan, Regis Consilario et Medico ordinario, Professore Regio in Ludovicæo Monspelienſi, Societ. regis Scient. Monspel. Sodali, regis Scient. Humaniorum Litterarum et Inscriptionum Tolosane Correspondenti, Academiæ Botaniciæ Florentinæ Socio honorario.—Argentorati. Sumptibus Amandi König, bibliopolæ, 1770. Cum privilegio Regis.—

OR,

*Histoire des Poissons, contenant la Description Anatomique de leurs parties externes & internes, & le caractere des divers Genres rangés par Classes & par Ordres. Avec un Vocabulaire complet, des Tables raisonnées en latin & en françois, des Expériences sur le Mouvement natatoire et musculaire, sur le mécanisme de la Respiration, sur les organes de l'Ouïe et de la Generation, & des Estampes qui représentent les principales parties anatomiques & quelques Genres nouveaux. Par M<sup>r</sup> Antoine Goüan, . . . —à Strasbourg, chez Amand König, Libraire. 1770. Avec privilege du Roi. [4to., xviii (doubled), 252 (1-228 doubled) + [3] pp., 4 pl. folded.]*

The text is in both Latin and French, corresponding on opposite pages.



The title of this work is misleading, as only the *Genera* of fishes are described. The modifications introduced into the class by Linné in the tenth edition of the *Systema Naturæ* (the exclusion of the *Chondropterygii*, less *Acipenser* and with the addition of *Lophius*, and their union with the *Amphibia*) are adopted. Thus limited, the genera are (1) combined according to the Artedian system, and (2) those combinations then subdivided, with Linné, into groups distinguished by the want or position of the ventral fins. The genera were quite well described, and three new ones still retained in the System (*Lepadogaster*, *Lepidopus*, and *Trachipterus*) were established.

1782-1795.

**BLOCH (Mark Eliesser).** D. Marcus Eliesser Bloch's, . . . , ausübenden Arztes zu Berlin, Oekonomische Naturgeschichte der Fische Deutschlands. [Text, 4to.; Pl., obl. fol., 3 v. viz:—

- [1.] Mit sieben und dreissig Kupfertafeln nach Originalen. Erster Theil.—Berlin, 1782. Auf Kosten des Verfassers und in Commission bei dem Buchhändler Hr. Hesse. [8 p. l., 258 pp.]
  - [2.] Mit fünf und dreissig Kupfertafeln nach Originalen. Zweiter Theil.—Berlin, 1783. Auf Kosten des Verfassers und in Commission in der Buchhandlung der Realschule. [4 pl., 192 pp.]
  - [3.] Mit sechs und dreissig ausgemalten Abdrücken nach Originalen und einem Titelkupfer. Dritter Theil. [=v. 2. 1784.]
- The text is in 4to.; the plates, in fol., without special titles.

——— D. Marcus Eliesser Bloch's, ausübenden Arztes zu Berlin, . . . . Naturgeschichte der ausländischen Fische. [Text, 4to.; Pl., obl. fol., 9 v. viz:—

- [4.] Mit sechs und dreissig ausgemalten Kupfern nach Originalen. — Erster Theil. Berlin, 1783. Auf Kosten des Verfassers, und in Commission in der Buchhandlung der Realschule. [viii, 136 pp.]
- [5.] [=v. 4.] Zweiter Theil. Berlin 1786. [=v. 4.—viii, 160 pp.]
- [6.] Mit sechs und dreissig ausgemalten Kupfern nach Originalen und einem Titelkupfer. Dritter Theil. Berlin 1787. [=v. 4, 5.—xiv, 146 pp.]
- [7.] Mit sechs und dreissig Ausgemalten Kupfern nach originalen. Vierter Theil. Berlin 1790. Bey den Königl. Akademischen Kunsthändlern J. Morino & Comp. [xii, 128 pp.]
- [8.] [=v. 7.] Fünfter Theil. Berlin 1791. [=v. 7.—viii, 152 pp.]
- [9.] [=v. 7, 8.] Sechster Theil. Berlin 1792. [=v. 7, 8.—xii, 126 pp.]
- [10.] [=v. 7-9.] Siebenter Theil. Berlin 1793. [=v. 7-9.—xiv, 144 pp.]
- [11.] [=v. 7-10.] Achter Theil. Berlin 1794. [v. 7-10.—vi, 174 pp.]
- [12.] Mit sechs und dreissig Ausgemalten Abdrücken nach Originalen. Neunter Theil. Berlin 1795. Im Verlage der Morinoschen Kunsthandlung. [iv, 192 pp.]

The nine parts of the last work (Natural History of Foreign Fishes) were complementary to the first (Economical History of the Fishes of Germany), and together formed a uniform series, afterwards entitled:—

Allgemeine Naturgeschichte der Fische.

The three volumes of the first work formed volumes I to III of the collection, and the nine of the last, volumes IV to XII.

November, 1872. 6

— *Ithyologie, ou Histoire Naturelle, générale et particulière des Poissons.*  
Avec des figures enluminées, dessinées d'après nature. Par Maro Eliséer Bloch, . . . [Fol., 12 v., viz:—

[1<sup>re</sup> SERIE.]

- [1.] Première partie. Avec 37 planches.—À Berlin, chez l'auteur, et chez François de la Garde libraire, 1785. [5 p. l., 206 pp., 1 l., pl. 1-37.]
- [2.] Seconde partie. Avec 35 planches.—[=v. 1.] 1785. [1 title, 170 pp., 1 l., pl. 38-72.]
- [3.] Troisième partie. Avec 36 planches.—[=v. 2.] 1786. [1 p. l., 160 pp., 1 l., pl. 73-107.]
- [4.] Quatrième partie. Avec 36 planches.  

A Berlin,	}	chez	{	l'Auteur, & ? chez François de la Garde libraire.
A Paris,				Didot le jeune, . . . .
A Londres,				White & Fils, . . . . 1787.

[1 p. l., 134 pp., 1 l., pl. 109-144.]

- [5.] Cinquième partie. Avec 36 planches.—[=v. 4.] 1787. [1 p. l., 130 pp., 1 l., pl. 145-180.]
- [6.] Sixième et dernière partie. Avec trente-six planches.—[=v. 4, 5.] 1788. [1 p. l. viii, 150 pp., 1 l., pl. 181-216.]

[2<sup>e</sup> SERIE.]

- [7.] Septième partie. Avec 36 planches.—À Berlin, chez l'Auteur.—À Leipzig dans la Musée de Mr. Beygang et chez tous les libraires d'Allemagne, 1797. [1 p. l. viii, 104 pp., 1 l., pl. 217-252.]
- [8.] Huitième partie. Avec 36 planches.—[=v. 7.] 1797. [1 p. l. iv, 122 pp., 1 l., pl. 253-288.]
- [9.] Neuvième partie. Avec 36 planches.—[=v. 7, 8.] 1797. [1 p. l., 110 pp., 1 l., pl. 289-324.]
- [10.] Dixième partie. Avec 36 planches.—[=v. 7-9.] 1797. [1 p. l., v, 120 pp., 1 l., pl. 325-360.]
- [11.] Onzième partie. Avec 36 planches.—[=v. 7-10.] 1797. [2 p. l., 136 pp., 1 l., pl. 361-396.]
- [12.] Douzième partie. Avec 36 planches.—[=v. 7-11.] 1797. [1 p. l. ii, 142 pp., 2 l., pl. 397-432.]

A translation, by Laveau, of the preceding series.

A cheap edition of this work was published in "Suites à Buffon" (v. 32-41), with the plates of Bloch, copied and reduced by J. E. Deseve, and under the following title:—

— *Histoire Naturelle des Poissons, avec les figures dessinées d'après nature par Bloch.* Ouvrage classé par ordres, genres et espèces, d'après le système de Linné; avec les caractères génériques; par René Richard Castel, . . . .  
Second édition.—A Paris, chez Déterville, . . . . an X, [1802. 12mo, 10 v., with 160 pl. 3<sup>e</sup> éd. Roret, 1837.—26 fr. 20c.; col. 47 fr.]

1787.

**HAÜY (Rene Just).** *Encyclopédie Méthodique.—Histoire Naturelle.* Tome troisième. Contenant les Poissons. [Anon.]—A Paris, chez Panckoucke, libraire, . . . . A Liège, chez Plomteux, imprimeur des États. 1787 . . . . [4to., 2 p. l. ix, 435 pp.]

This is a dictionary, in which the Linnæan orders (miscalled classes of orders), genera, and species are described under their French names in alphabetical order. Tabular synopses (each on a special page) are also given of the classes, genera, and species under their French names, in connection with the descriptions. The work is a very poor and imperfect compilation, by an author practically unacquainted with Fishes as well as with the then recent literature of the subject. The following is a complement to it:—

1788.

**BONNATERRE** (J . . . P . . .). *Tableau Encyclopédique et Méthodique des trois règnes de la Nature, dédié et présenté à M. Necker, Ministre d'Etat, & Directeur général des Finances. — ICHTHYOLOGIE. — Par M. l'Abbé Bonnaterre. . . . — A Paris, chez Panckoucke, libraire, . . . . 1788. . . . [4to., vi, 215 pp., 2 (A, B) + 100 pl.]*

A poor compilation, arranged according to the Linnæan classification, by an individual who was employed by Panckoucke, the publisher of the *Encyclopédie Méthodique*, to bring together the illustrations of the Mammals, Birds, Reptiles, Fishes, and Insects. The compiler has availed himself of the works of most of the authors preceding, and collected illustrations of more than 400 species.

1788.

**GMELIN** (Johann Friedrich). *Caroli a Linné, Equitis aurati de stella polari, Archiatri Regii, Med. et Botan. Profess. Upsal. Acad. Paris. Upsal. Holm. Petropol. Berolin. Imper. Londin. Angl. Monsp. Tolos. Florent. Edinb. Bern. Soc. Systema Naturæ per regna tria Naturæ, secundum Classes, Ordines, Genera, Species, cum characteribus, differentiis, synonymis, locis. Tomus I. [—] III. Editio Decima tertia, Aucta, Reformata. Cura Jo. Fred. Gmelin, Philos. et Med. Doctor. Hujus et Chem. in Georgia Augusta Prof. P. O. Acad. Caesar. Naturæ Curiosorum et Electoral. Moguntin. Erfordensis, neo non Societ. Reg. Scient. Goettingensis, Physicæ Tigurin., et Metallicæ Membri. — Lipsiæ, 1788–93. Impensis Georg. Emanuel. Beer. [8vo., 4120 pp., 3 v. in 9 parts, viz:—*

The three volumes, being very much amplified, were divided into parts, with half titles, for binding, viz:—

Tomus I. [Regnum Animale: pars i. (*Mammalia*; *Aves*, ordines 1–2), 6 p.l., pp. 1–500: pars ii. (*Aves*, ordines 3–6), 1 p.l., pp. 501–1032: pars iii. (*Amphibia*, *Pisces*), 1 p.l., pp. 1033 (Places, 1126)–1516: pars iv. (*Insecta*, ordines 1–2), 1 p.l., pp. 1517–2224: pars v. (*Insecta*, ordines 3–7), 1 p.l., pp. 2225–3020: pars vi. (*Vermes*), 1 p.l., pp. 3021–3910: pars vii. (*Indices*), 1 p.l., pp. 3911–4120.] 1789.

Tomus II. [Regnum Vegetabile:] pars i., 1 p.l. xl, 884 pp.: pars ii., 1 p.l., pp. 885–1661.] 1791.

Tomus III. [Regnum Lapideum.] 476 pp., 3 pl. folded. 1793.

This edition is noticed under the date of 1788 and the name of Gmelin, as that naturalist is alone responsible for the incorporation of the many species described since the last edition of the *Systema Naturæ* revised by Linné. The compilation displays very little acquaintance with any branch of Zoology, and species are incorporated into the system in defiance of the characters of the groups to which they are referred. This is evidently the result of blind confidence in the accuracy and

powers of discrimination of those whose species were incorporated by him into the System, as he did not hesitate to adopt their views as to generic relations, however much the inherent evidence of their own descriptions might oppose their views. A large number of the species were thus repeated under different specific as well as generic names. The number of nominal species was thereby increased to 826, grouped under 65 genera, (150a) *Sternoptyx*, (150b) *Leptocephalus*, (155a) *Kurtus*, (165a) *Scarus*, and (170a) *Centrogaster* having been added to the Linnæan genera. Gmelin, however, improved on the Linnæan system by the re-combination of the Amphibia nantes with the Pisces, and he re-adopted the orders (V) Branchiostegi and (VI) Chondropterygii. He erred, on the other hand, in separating *Mormyrus* from the Abdominales and referring it to the Branchiostegi.

1792.

**WALBAUM (Johann Julius).** Petri Artedi Sueci Genera Piscium. In quibus Systema totum Ichthyologiæ proponitur cum classibus, ordinibus, generum characteribus, specierum differentiis, observationibus plurimis. Redactis speciebus 242 [228] ad Genera 62 [45]. Ichthyologiæ Pars III.—Emendata et aucta a Johanne Iulio Walbaum, M.D., Societatis Berolinensis Naturæ Curiosorum, et Societatis Litterariæ Lubecensis Sodali. Cum tabula ænea.—Grypeswaldiæ, impensis Ant. Ferdin. Röse 1792. [8vo., 4 p. l., 723 pp., 3 pl.]

A poor compilation, like Gmelin's, in which the various previously described species were introduced without a critical study into the system, and described in foot-notes in connection with the Artedian species, but combined under the Linnæan genera. The nominal species (and many are only nominal), excluding the cetaceans, are thus raised from 228 to about 965, without counting the species enumerated under the new genera of authors appended to the volume. The compilation has some value, not only on account of the original descriptions of species copied from previous authors, but because of the reproductions of the descriptions of the new genera introduced by various authors into the system. It is also of interest to the student of American species by reason of the incorporation therein, under specific names, of anonymous American species described by Schoepf.

1798-1803.

**LACEPÈDE (Bernard Germain Étienne de la Ville-sur-Ilion, Comte de).** Histoire Naturelle des Poissons, [v. 1] par le citoyen La Cépède, membre de l'Institut national, et Professeur du Muséum de histoire naturelle. Tome premier [-5].—A Paris, chez Plassan, imprimeur libraire, Rue du Cimetière André-des-Arcs, No. 10. L'an VI de la République.—1798. [—L'an XI de la République, i. e., 1803] [4to., 5 v.]

The title-page was modified in each volume, and the personal titles successively increased in number; the address of the publisher was changed (in v. 3-5); the last volume (on title-page) was dedicated to his late wife; and only the first volume bears the date of the Christian era.

Originally published and frequently reproduced in connection with Buffon's works, e. g., Buffon, 1st ed. (1749-84), v. 39-43; 1st 12mo. ed. (1752-1805), v. 78-88; Lacépède's 1st ed. (1799-1802), 14 v.; Lacépède's 2d ed. (1817-19), v. 13-17; Lamouroux and Desmarest's ed. (1824-32), suite—i. e., Œuvres du Comte de Lacépède—v. 5-11; Leconte's ed. (1829-34), about 25 v.; also, republished in "Histoire Naturelle" (Furze et c<sup>ie</sup>), in 1855: the compilation ascribed to SONNINI DE MANDONCOUR

(Charles Nicolas Sigisbert) is also merely a slightly modified reprint of the same work. The last is entitled: *Histoire Naturelle générale et particulière des Poissons; ouvrage faisant Suite à l'Histoire Naturelle, générale et particulière; composée par Leclerc de Buffon, et mise dans un nouvel ordre [v. 9, 10, 11, "Redigée"] par C. S. Sonnini, avec des notes et additions. Par C. S. Sonnini, . . . —Paris, de l'imprimerie de F. Dufart, an XI [—] XII [1803-1805—8vo., 13 vols.]*

A work by an able man and eloquent writer (even prone to aid rhetoric by the aid of the imagination, in absence of desirable facts), but which, on account of undue confidence in others, default of comparison of materials from want thereof and otherwise, and carelessness generally, is entirely unreliable. Many species appear under several different names, and in genera widely separated. The classification adopted is a procrustean system of (1) subclasses, (2) divisions, and (3) orders.

*First, Subclasses*, based on the supposed consistence of the skeleton (Sousclasses) (1) Poissons cartilagineux; (2) Poissons osseux.

*Second, Divisions*, under each subclass, established on the supposed presence or absence and various combinations (4) of the opercula and branchiostegal membrane, that is, the presence of both; of one; or the other; or, none.

*Third, Orders*, distinguished by the absence of ventrals (Apodes), or their presence at different regions (Jugulaires, Thoracins, Abdominaux).

Several of these categories are non-existent in nature, and the reference of species to them is due to erroneous observation or supposition.

Fourteen hundred and sixty-three (1463) nominal species were described.

1801.

**BLOCH** (Mare Ellisser), and **Johann Gottlob SCHNEIDER**. M. E. Blochii, Doctoris Medicinæ Berolinensis, et societatibus literariis multis adscripti, *Systema Ichthyologiae iconibus ex illustratum. Post obitum auctoris opus inchoatum absolvit, correxit, interpolavit Jo. Gottlob Schneider, Saxo.*—Berolini, sumptibus auctoris impressum et bibliopolo Sanderiano commissum. 1801. [8vo., 1x, 584 pp., 110 col. pl.]

A compilation in which the various species described by authors are collected together, and referred with very little judgment to the genera admitted. The class is arranged in a new manner, avowedly according to the number of the fins, but very frequently in defiance of their true number and morphology, as notably in the genera 1, 2, 4, 7, 21, 37, 38, but, also, in very many others. The system is as follows, the genera described as new (in Bloch's previous works as well as the present) being indicated by italics:—

Classis I. Hendecapterygii. (11 fins.)—1. *Lepadogaster*.

Classis II. Decapterygii. (10 fins.)

Ordo i. Jugulares.—2. *Gadus*.

Ordo ii. Thoracici.—3. *Trigla*.

Ordo iii. Abdominales.—4. *Polynemus*.

Classis III. Enneapterygii. (9 fins.)—5. *Scomber*.

Classis IV. Octopterygii. (8 fins.)

Ordo i. Jugulares.—6. *Gallionymus*; 7. *Batrachus*; 8. *Uranoscopus*; 9. *Enchelyopus*; 10. *Trachinus*; 11. *Phycis*.

Ordo ii. Thoracici.—12. *Platycephalus*; 13. *Cottus*; 14. *Periophthalmus*; 15. *Eleotris*; 16. *Gobius*; 17. *Johnius*; 18. *Mullus*; 19. *Sciaena*; 20. *Percs*; 21. *Xiphias*; 22. *Zeus*; 23. *Brama*; 24. *Monocentris*; 25. *Lonchurus*; 26. *Macrurus*; 27. *Agonus*; 28. *Eques*.

Ordo iii. Abdominales.—29. *Cataphractus* (=Callichthys); 30. *Sphyræna*; 31. *Atherina*; 32. *Centriscus*; 33. *Fistularia*; 34. *Mugil*; 35. *Gasterosteus*; 36. *Loricaria*; 37. *Squalus*.

Classis V. Heptapterygii. (7 fins.)

Ordo i. Jugulares.—38. *Lophius*; 39. *Pteraclis*; 40. *Pleuronectes*; 41. *Kyrtus*; 42. *Trichogaster*; 43. *Centronotus* (=Murænoides); 44. *Blenius*; 45. *Percis*; 46. *Trichonotus*.

Ordo ii. Thoracici.—47. *Monoceros*; 48. *Grammistes*; 49. *Scorpæna*; 50. *Synanceia*; 51. *Cyclopterus*; 52. *Amphiprion*; 53. *Amphacanthus* (=Teuthis, L.); 54. *Acanthurus*; 55. *Chætodon*; 56. *Alphestes*; 57. *Ophiocephalus* (Bl. Ausl. Fische, viii); 58. *Lepidopus*; 59. *Echeneis*; 60. *Cepola*; 61. *Labrus*; 62. *Sparus*; 63. *Scarus*; 64. *Coryphæna*; 65. *Epinephelus*; 66. *Anthias*; 67. *Cephalopholis*; 68. *Calliodon*; 69. *Holocentrus*; 70. *Lutianus*; 71. *Bodianus*; 72. *Cichla*; 73. *Gymnocephalus*.

Ordo iii. Abdominales.—74. *Acipenser*; 75. *Chimæra*; 76. *Pristis*; 77. *Rhina*; 78. *Rhinobatus*; 79. *Raja*; 80. *Platystacus*; 81. *Silurus*; 82. *Anableps*; 83. *Acanthonotus* (=Notacanthus); 84. *Esox*; 85. *Synodus*; 86. *Salmo*; 87. *Clupea*; 88. *Exocoetus*; 89. *Chauliodus*; 90. *Elops*; 91. *Albula*; 92. *Cobitis*; 93. *Cyprinus*; 94. *Amia*; 95. *Poecilia*; 96. *Pegasus*; 97. *Mormyrus*; 98. *Polyodon*; genus dubium 99. *Argentina*.

Classis VI. Hexapterygii. (6 fins.)

[Ordo i.] *Apodes*.—100. *Balistes*; 101. *Rynchobdella*.

Ordo ii. *Pinna anali carentes*.—102. *Trachypterus*; 103. *Gymnetrus* (=Regalecus Brunn).

Classis VII. Pentapterygii. (Fins 5.)

Ordo i. *Apodes*.—104. *Ophidium*; 104a. *Pomatias*; 104b. *Gnathobolus* (=Odontognathus Lac.); 105. *Muræna*; 106. *Stromateus*; 107. *Ammodytes*; 108. *Sternoptyx*; 109. *Anarrhicas*; 110. *Channa*; 111. *Sternarchus*; 112. *Ostracion*; 113. *Tetrodon*; 114. *Orthragoriscus*; 115. *Diodon*; 116. *Syngnathus*.

Classis VIII. Tetrapterygii, *Apodes*.—117. *Trichiurus*; 118. *Bogmarus* (=Trachypterus Gouan); 118a. *Tænoides*; 119. *Stylephorus*.

Classis IX. Tripterygii.

Ordo i. *Apodes*.—120. *Gymnonotus*.

Ordo ii. *Achiri et Apodes*.—121. *Synbranchus*; 122. *Gymnothorax* (=Muræna L.).

Classis X. Dipterygii.

Ordo i. *Apodes*.—123. *Ovum*.

Ordo ii. *Apodes et Achiri*.—124. *Petromyzon*; 125. *Leptocephalus*.

Classis XI. Monopterygii. *Apodes et Achiri*.—126. *Gastrobranchus* (=Myxine Linn.); 127. *Sphagebranchus* (=Ophichthys Ahl.); 127a. *Fluta* (=Monopterus Lac.); 128. *Typhlobranchus*.

1803–1804.

**SHAW (George).** General Zoology or Systematic Natural History. By George Shaw, M.D., F.R.S., &c., with plates from the first authorities and most select specimens, engraved principally by Mr. Heath. — [Specifications.] — London: [v. 1–7.] Printed for G. Kearsley, Fleet Street. [v. 8–14, by others]. 1800 [—] 1826. [8vo., 14 v.]

Besides the engraved title, copied above, there is, on the following leaf, a short printed one, viz:—General Zoology.—[Specifications.]—London: [Publishers].—1800 [—] 1826. The later volumes were by James Francis Stephenson.

The Ichthyological portion is contained in the fourth and fifth volumes, viz:—

Vol. IV. Part I. Pisces.— . . . 1803. [1 eng. title, 1 plain title, pp. v, [1,] 1-186, pl. 1-25.—*Apodes* 53 sp.; *Jugulares*, 53 sp.=106 sp.]

Vol. IV. Part II. Pisces.— . . . 1803. [1 eng. title, pp. xi, [+ii], incl. pl. title, 187-632, pl. 26-92+43, 65, 69, 74.—*Thoracici*, 672 sp.]

Vol. V. Part I. Pisces.— . . . 1804. [1 eng. title, 1 pl. title, pp. v, [+iii,] 1-250, pl. 93-132.—*Abdominales*, 261 sp.]

Vol. V. Part II. Pisces.— . . . 1804. [1 eng. title, pp. vi, [+ii,] incl. pl. title, 251-463, pl. 133-182+158.—*Cartilaginei*, 191 sp.]

This part is a compilation, based on the system of Linné as modified by Gmelin in the restoration of the Amphibia nantes to the Fishes. It is even worse than its predecessors in the incorporation of species unknown to Linné in the genera. The illustrations are almost entirely copied from the works of Bloch and Lacépède, only five or six (according to Cuvier), representing species in the British Museum, being original. Two new generic types (*Trachichthys* and *Stylophorus*) are added, one of which, however (*Trachichthys*), had been previously described in the Naturalists' Miscellany (v. X).

Twelve hundred and thirty (1230) nominal species were described.

The generic diagnoses, it may be added, were copied (sometimes with very slight modifications) by Dr. S. L. Mitchill in his memoir ("The Fishes of New York, described and arranged") in the "Transactions of the Literary and Philosophical Society of New York."

1828-1849.

**CUVIER** (Georges Chrétien Léopold Dagobert, baron) and **Achille VALENCIENNES**. Histoire naturelle des poissons, par M. le B<sup>re</sup> Cuvier, . . . ; et par M. Valenciennes, . . . Tome premier [—Tome vingt-deuxième.]—À Paris, [v. 1-12] chez F. G. Levrault, . . . 1828 [-37]; [v. 13-14], chez Pitois-Levrault et C<sup>e</sup>, . . . 1839; [v. 15]; chez Ch. Pitois, éditeur, . . . 1840; [v. 16-22] chez P. Bertrand, [etc.]. 1842-1849.

As indicated on the reverse of the bastard title, all the volumes were printed at Strasbourg, v. 1 to 13 having been printed by F. G. Levrault (Imprimerie de F. G. Levrault), and v. 14 to 22 by the widow Levrault. (Imprimerie de V<sup>e</sup> Berger-Levrault.)

#### CONTENTS.

v. 1. Livre premier.—Tableau historique des progrès de l'ichthyologie, depuis son origine jusqu'à nos jours.

Livre deuxième.—Idée générale de la nature et de l'organisation des poissons. 1828.

v. 2-3. Livre troisième.—Des poissons de la famille des Perches, ou des Percoides. [Par Cuvier.] 1828-29.

- v. 4. Livre quatrième.—Des acanthoptérygiens à joue cuirassée. [Par Cuvier.] 1829.
- v. 5. Livre cinquième.—Des Scénoïdes. [Par Cuvier.] 1830.
- v. 6. Livre sixième.—(Partie I. Des Sparoïdes; Partie II. Des Ménides.) 1830. [Par Cuvier et Valenciennes.]
- v. 7. Livre septième.—Des Squamipennes. [Par Cuvier?]  
Livre huitième.—Des poissons à pharyngiens labyrinthiformes. 1831. [Par Cuvier?]
- v. 8-9. Livre neuvième. Des Soombéroïdes. 1831-33. [Par Cuvier et Valenciennes.]
- v. 10. Suite du l. 9.—Des Scomberoïdes. [Par Cuvier et Valenciennes?]  
Livre dixième.—De la famille des Teuthies. [Par Cuvier et Valenciennes?]  
" onzième.—De la famille des Tœnioïdes. [Par Cuvier et Valenciennes?]  
" douzième.—Des Atherines. 1835. [Par Cuvier et Valenciennes?]
- v. 11. Livre troisième.—Des Mugiloïdes.  
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- v. 12. Suite du livre quatorzième.—Gobioides.  
Livre quinzième.—Des acanthoptérygiens à pectorales pédiculées. 1837.
- v. 13. Livre seizième.—Labroïdes. 1839.
- v. 14. Suite du livre seizième.—Labroïdes.  
Livre dix-septième.—Des Malacoptérygiens. Des Siluroïdes. 1839.
- v. 15. Suite du livre dix-septième.—Siluroïdes. 1840.
- v. 16-17. Livre dix-huitième.—Cyprinoïdes. 1842.
- v. 18. Suite du livre dix-huitième.—Cyprinoïdes.  
Livre dix-neuvième.—Des Esoces ou Lucioïdes. 1846.
- v. 19. Suite du livre dix-neuvième.—Brochets ou Lucioïdes.  
Livre vingtième.—De quelques familles\* de Malacoptérygiens, intermédiaires entre les Brochets et les Clupes. 1846.
- v. 20. Livre vingt et unième.—De la famille des Clupéoides. 1847.
- v. 21. Suite du livre vingt et unième et des Clupéoides.† 1848.  
Livre vingt-deuxième.—De la famille des Salmonoides.
- v. 22. Suite du livre vingt-deuxième.—Suite de la famille des Salmonoides. 1849.

Two editions were published, one in octavo and the other in quarto, but from the same types, adjusted only for difference of form. Of each edition, copies with colored and uncolored plates were published; the price of the octavo edition with plain plates was, for the first twelve volumes, 13 francs 50 centimes per volume, afterwards (v. 13-22), 19 francs 50 centimes; with colored plates, 23 francs 50 centimes, afterwards raised to 39 francs 50 centimes; of the quarto edition with plain plates, at first 18 francs, and afterwards (v. 13-22), 28 francs; with colored plates, 18 francs, afterwards 48 francs per volume. For sets in octavo with plain plates, 800 (Grasse) or 429 (Lorenz) francs, and with colored plates, 600 (Grasse) or 869 (Lorenz) francs; in quarto with plain plates, 480 (Grasse) or 616 (Lorenz) francs, and with colored plates, 800 (Grasse) or 1056 (Lorenz) francs.

\* The families referred to are: Chirocentres (with the genus *Chirocentrus*), Alepocephales (with *Alepocephalus*), Lutodolires (with *Onanos* and *Gonorhynchus*), Mormyres (with *Mormyrus*), Hyodontes (with *Ontoglossum*, *Ischnosoma*, and *Hyodon*), Butirins (with *Albula*=*Butirinus*) Élopiens (with *Elope* and *Megalops*), Amies (with *Amia*), Vastres ou Amies? (*Vastres*), famille particulière, ou Amies? (*Heterotis*), Erythroïdes (with *Erythrinus*, *Microdon*, *Labastina*, and *Pyrhulinas*), and Ombres (with *Umbra*)

† The Neoptères are differentiated from the Clupéoides as a very distinct family (une famille très distincte).s



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| 20. xviii, 472 pp. 1 l. | xiv, 346 pp. 1 l.          | pl. 591-606. 1847.  |
| 21. xiv, 536 pp.        | xiii [+ iii], 391 pp.      | pl. 607-633. 1848.  |
| 22. xx, 532, 91(+1) pp. | xvi, 395, [Index] 81+1 pp. | pl. 634-650. 1849.  |

4514† nominal species were described in the 22 volumes: all belonging to the order Teleostei, except the Gasterosteidae (17 sp.), Opisthomi ( sp.), Nematognathi (298 sp.), Scyphophori (12 sp.), and Amlidae (10 sp.), to balance which the Cichlidae (or Chromididae), Anacanthini and Gymnarchidae almost alone remained to be described.

#### COMPLEMENTARY. 1865-1870.

**DUMÉRIL (August).** Histoire naturelle des Poissons ou Ichthyologie générale par Aug. Duméril [,] professeur-administrateur au Muséum d'Histoire naturelle de Paris.—Ouvrage accompagné de planches.—[See "contents."]—Paris [,] Librairie encyclopédique de Borel, . . . 1865. [-]1870. [Text 8vo. Atlas, larger 8vo.]

#### CONTENTS.

Tome premier [,] *Clasmobranches* [i. e.] *Plagiostomes et Holocéphales ou Chimères*.—Première partie. . . 1865. [2 p. l. pp. 1-352]; Seconde partie. . . 1865. [2 p. l. pp. 353-720.—With atlas, 16 fr.; col., 19 fr.]  
Tome second [,] *Ganoides, Dipnés, Lophobranches*. . . 1870. [2 p. l. 624 pp.]

\* The plates illustrating the first volume, and representing the anatomy of fishes, were in one edition, issued in a folio fasciculus.

† In this enumeration, I have adopted without verification the statements by Dr. Günther, published in the several volumes (I, II, III, V, VI) of his Catalogue of Fishes, and added *Pterophyllum* (1 sp.), *Pomacentridae* (74 sp.), *Labridae* (331 sp.), *Cyprinidae* and *Cyprinodontidae* (438+54=492 sp.), *Esocidae* (10 sp.), *Galaxiidae* (7 sp.), *Scomberesocidae* (90 sp.), *Mormyridae* (20 sp.), *Amlidae* (10 sp.), *Umbridae* (1 sp.) and *Salmonidae* (105 sp.)

Atlas. [Pl. 1-14 to v. 1, with 8 pp. (1-8) explanatory, including title; Pl. 15-26 to v. 2, with separate title-page and pp. 9-12 explanatory.]

The plan of this work was quite elaborate, and systematic summaries of the anatomical characteristics of the various major groups have been given in the volume published, in addition to an extended introduction on Ichthyology. 618 nominal species are described or indicated, *including* those which the author did not especially call doubtful, but which, from want of sufficient precision and details in the descriptions or other cause, he could not contrast in his synoptical tables: these 616 species were arranged under 101 genera, 35 families, and 7 orders, and represented 4 subclasses.

In order to exhibit the contrast in the mode of treatment of the groups in question by two contemporaneous ichthyologists, the following details respecting the numbers of species are given without other comment than that the sequence and details of classification in Günther's work are also different.

	DUMÉNIL, 1865-70.	GÜNTHER, 1870.
I <sup>e</sup> . Sous-classe, Elasmobranches		
Plagiostomes		
Squales	129 (+10 d)	128+18 d.
Raies	177 (+ 6 d)	130+37 d.
Holocephales	8	4
II <sup>e</sup> . Sous-classe, Ganoides.		
Chondrostés	85	22+10 d.
Holostés	8	
Lépidostéidés	30	3+ 1 d.
Polyptéridés	6	2
Amiadés	12	1
III <sup>e</sup> . Sous-classe, Dipnés	2	3
IV <sup>e</sup> . Sous-classe, Lophobranches		
Hypostomidés	4	4
Prostomidés	165	116+25 d.

1859-1870.

**GÜNTHER (Albert C. L. G.).** Catalogue of the fishes in the British museum.

By Albert Günther, . . . . Volume first [to volume eight].—London: printed by order of the trustees. 1859-1870. [8vo., 8 v.]

This important work was commenced with a more restricted design and title, the first three volumes being designated as indicated below, and the general title was only assumed with the fourth volume: at the end of that volume, general titles for the preceding ones were supplied, and that and all subsequent ones had double titles, —the general and the special here reproduced, viz:—

v. 1-3.—Catalogue of the Acanthopterygian fishes in the collection of the British museum. By Dr. Albert Günther.

Volume first. Gasterosteidæ, Berycidæ, Percidæ, Aphredoderidæ, Pristipomatidæ, Mullidæ, Sparidæ. . . . 1859. [Genera title + xxxix, 524 pp.—10s.]

Volume second. Squamipinnes, Cirrhitidæ, Triglidæ, Trachinidæ, Scœnoidæ, Polynemidæ, Sphyrænidæ, Trichiuridæ, Scombridæ, Carangidæ, Xiphidæ. . . . 1860. [General title + xxi, 548 pp.—8s. 6d.]

Volume third. Gobridæ, Discoboli, Oxuderoidæ, Batrachidæ, Pediculati, Blenniidæ, Acanthoelinidæ, Comephoridæ, Trachypteridæ, Lophotidæ, Teuthididæ, Acronuridæ, Hoplognathidæ, Malacanthidæ, Nandidæ, Polycentridæ, Labyrinthici, Luciocephalidæ, Atherinidæ, Mugilidæ, Ophiocephalidæ, Trichonotidæ, Cepolidæ, Gobiesocidæ, Psychrolutidæ, Centriscidæ, Fistularidæ, Mastacembelidæ, Notacanthi. . . . 1861. [General title + xxv, 586 + x pp.\*—10s. 6d.]

v. 4.—Catalogue of the Acanthopterygii pharyngognathi and Anacanthini in the collection of the British museum, . . . 1862. [General title + xxi, 534 pp.—5s. 6d.]

v. 5.—Catalogue of the Physostomi, containing the families Siluridæ, Characindæ, Haemulonidæ, Sternopygidae, Scopelidæ, Stomatidæ in the collection of the British museum, . . . 1864. [ (including general title) xxii, 455 pp.—]

v. 6.—Catalogue of the Physostomi, containing the families Salmonidæ, Percopidæ, Galaxidæ, Mormyridæ, Gymnarchidæ, Esocidæ, Umbridæ, Scombroscidæ, Cyprinodontidæ in the collection of the British museum, . . . 1866. [xv, 368 pp.]

v. 7.—Catalogue of the Physostomi, containing the families Heteropygii, Cyprinidæ, Gonorhynchidæ, Hyodontidæ, Osteoglossidæ, Clupeidæ, Chirocentridæ, Alepocephalidæ, Notopteridæ, Halosauridæ in the collection of the British museum, . . . 1868. [xx, 512 pp.]

v. 8.—Catalogue of the Physostomi, containing the families Gymnotidæ, Symbranchidæ, Muraenidæ, Pegasidæ, and of the [orders] Lophobranchii, Plecognathi, [and sub-classes] Dipnoi, Ganoidæ, Chondropterygii, Cyclostomata, Leptocardii, in the British museum, . . . 1870. [xxv, 549 pp.]

"In the present work, 6843 species are regarded as well established and described; whilst 1682 others are doubtful and referred to by name only. Assuming, then, that about one-half of the latter will be ultimately admitted into the system, and that, since the publication of the volume of this work, about 1000 species have been described elsewhere, we may put the total number of fishes known at present as about 9000." Gthr. v. 8, p. vi.

\* A "Systematic synopsis of the families of the Acanthopterygian fishes" (x pp.) is given as an appendix to the third volume.



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SMITHSONIAN MISCELLANEOUS COLLECTIONS.

256

MONOGRAPHS

OF THE

D I P T E R A

OF

NORTH AMERICA.

PART III.

PREPARED FOR THE SMITHSONIAN INSTITUTION

BY

H. LOEW.



WASHINGTON:  
SMITHSONIAN INSTITUTION.

DECEMBER, 1873.

## ADVERTISEMENT.

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THE present publication is Part III of a work upon the Diptera of North America, prepared at the request of the Smithsonian Institution, by Dr. H. Loew, of Guben, Prussia, well known as one of the most eminent cultivators of this branch of entomology.

The first part of this series of monographs was published in 1862, and included the families of *Trypetidæ*, *Sciomyzidæ*, *Ephydrinidæ*, and *Cecidomyidæ*. The second part appeared in 1864, and consisted principally of a monograph of the *Dolichopodidæ*. The fourth part was issued in 1869, embracing a monograph of part of the *Tipulidæ*.

They were not published in sequence, but in the order in which materials could be collected for their preparation. The original manuscript of Dr. Loew was written in German, and the Institution is indebted to Baron R. Osten-Sacken for translating it into English; and to Mr. R. A. Witthaus, Jr., of New York, for revising and correcting the proof-sheets, in the absence of Baron Osten-Sacken.

JOSEPH HENRY,

*Secretary S. I.*

WASHINGTON, Dec. 1873.

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### NOTE FROM THE TRANSLATOR.

Readers of these "Monographs" may notice discrepancies in some minor points of the terminology used in the first volume from that of the following ones. A few words of explanation are therefore necessary. The first volume was translated from Mr. Loew's German manuscript into English by a German friend of his (see Vol. I, p. v). The second and third volumes were translated either by me, or under my supervision. Although in all essentials the terminology adopted in Vol. I was followed, some changes, which I thought would be improvements, were introduced. Thus, *feet* was used for *legs*; *ovipositor*, for *borer*; *crossvein*, for *transverse rein*; *arista*, for *antennal bristle*; thus *transverse shoulder vein* came to be *humeral crossvein*, and *hinder transverse vein*, *posterior crossvein*, etc. None of these changes can give rise to any error or uncertainty.—O. S.





# DIPTERA

OF

## NORTH AMERICA.

---

### PART III.

---

#### THE FAMILY ORTALIDÆ.

##### I.

##### INTRODUCTION.

IN the variety of forms the *Ortalidæ* are hardly surpassed by any other family of diptera; at the same time, they are hardly equalled by any in the importance of the structural differences occurring among them; hence, they may be considered as one of the most interesting families of the order. Nevertheless, but little has been done as yet for the exact definition of the limits of this family, as well as for its subdivision into smaller groups.

It would be impossible, therefore, to attempt a satisfactory description of the North American species of *Ortalidæ*, without first settling the questions of the true limits of the family, of its relationship to other families, and of the characters upon which it is established. It would also be indispensable to break the family up in subordinate groups and these groups in genera.

Of all these requirements, only one has been, as far as I can see, fulfilled, and that is, the definition of the limits between the *Trypetidæ* and the *Ortalidæ*, which I have tried to draw as well as I could, in the first volume of these monographs and in my earlier work on European *Trypetidæ*.

Through the successive, although disconnected, publications of several authors the systematic arrangement of the *Ortalidæ*, like that of some other families of diptera, has gradually reached a state of confusion which it is impossible to unravel without a detailed and somewhat lengthy discussion. I may be excused, therefore, if I preface the description of a comparatively small number of American species by an unusually long introductory chapter.

In order to point out the relationship of the *Ortalidæ* with other families, as well as the differences which distinguish them, it is necessary, first of all, to discover those characters which serve to define the family.

#### THE EUROPEAN ORTALIDÆ.

The examination of the works of Meigen, the founder of systematic dipterology, will afford a solid basis to proceed from, and I will begin with the European species which are the longest known and the best investigated.

##### *Meigen's Genus Ortalis.*

The nucleus of the European *Ortalidæ* is formed of those species which Meigen has brought together in the genus *Ortalis*, a genus which, in his acceptation, far exceeded the limits which we are accustomed to give to genera at present.

1. Characters which Meigen's species of *Ortalis* have in common.

I discovered a number of characters which the species of this genus have in common, and which also occur in many species added to the genus by subsequent authors. These common characters, to the exclusion of those which also belong to most of the neighboring families, are the following :—

Front broad in both sexes; a more or less distinctly developed small callosity runs from each corner of the vertex down the front; it bears in front of the lateral bristle of the vertex one or two distinct additional bristles; beyond this, the front is beset with only short hairs, or else quite bare; it never has the second row of bristles, nearer the orbit, which distinguishes all the genera of *Trypetidæ*.

Eyes bare, even under a strong lens; the compound microscope shows only some sparse, very short hairs.

The frontal fissure is distinct, but the frontal lunule is not pushed up as far as the front, so as to seem to form a part of it; on the contrary, it appears as the upper part of the face.

Vibrissæ, such as they appear in all the genera of *Helomyzidæ*, are not extant.

The clypeus is always distinct. The palpi are rather broad; the proboscis more or less stout.

The metathorax is larger than usual, very much projecting inferiorly and posteriorly.

The feet short and strong, rather than long and slender; middle tibiæ distinctly spurred; front and hind tibiæ spurless; the erect bristle extant in several families of the *Diptera acalyp-tera* on the upper side of the tibiæ, near their end, for instance in the *Sapromyzidæ* and *Sciomyzidæ*, does not occur here in any species.

The abdomen of the male has four segments, the first of which, like the first segment of the female abdomen, is formed of two coalescent segments; the diminutive fifth segment of the male abdomen forms the small, more or less imbedded hypopygium; the sometimes more filiform, in other instances tape-like, rolled up penis is of an extraordinary length.

The abdomen of the female consists of five segments; the sixth, seventh, and eighth segments are converted into a flattened, extensile ovipositor, the first joint of which surpasses the two following in breadth very much, and is often colored like the rest of the abdomen; the slender last joint of the ovipositor ends in a simple point.

The wings show the complete venation of the *Diptera acalyp-tera*; the auxiliary vein is entirely separated from the first longitudinal vein, although it is sometimes rather approximated to it; it ends at a more or less acute angle in the costal vein, without becoming less distinct at its end; the first longitudinal vein is provided with bristles, at least at its end; the two posterior basal cells are comparatively large.

2. Species erroneously placed in the genus *Ortalis*.

The agreement of all the species placed by Meigen in the genus *Ortalis* would have been complete if *O. pæcilopectera* (*fulminans* M.), *connexa*, *vibrans*, and *syngenesiæ* did not show differences, which require a special mention.

*O. pæcilopectera* and *connexa* differ from the other species in

the presence of a row of bristles on each side near the orbit, besides the bristles common to all the *Ortalidæ*. These bristles are a character so exclusively peculiar to the *Trypetidæ* that we cannot but consider those two species as belonging to that family (as I have already proved it elsewhere). They cannot, therefore, be further considered here.

*Ortalis vibrans*, the female of which has only four segments on the abdomen, approaches, in the absence of bristles upon the first longitudinal vein, *Palloptera* and the related genera so much, that one might be tempted to place it among the *Pallopteridæ*; but there are other genera having the first longitudinal vein bare, to which *Ortalis vibrans* is still more closely allied, and which, as I will have occasion to show hereafter, cannot possibly be separated from the *Ortalidæ*. Such being the case, *O. vibrans* has to remain in this family, and this is also justified by the large size of the two posterior cells in this species, which is a proof of its relationship to the other *Ortalidæ*. There is no doubt, at the same time, that this species is a stranger in Meigen's genus *Ortalis*.

*Ortalis syngenesiæ* is also distinguished from the other species of *Ortalis* by its abdomen, which has only four segments in the female; in other respects it is more related to them than *O. vibrans*; it is more closely allied to the species of the genus *Platystoma* than to the other species of Meigen's *Ortalis*.

#### *The other European Ortalidæ.*

After having thus disposed of those species placed by Meigen in the genus *Ortalis*, which have either to be entirely withdrawn from the family of *Ortalidæ*, or which can only conditionally be received in it, the next step to be taken, in order to chalk out the whole extent of the family *Ortalidæ*, is to discover such other genera as may likewise possess the characters common to the species of *Ortalis*. After this, we will have to point out such genera as possess not all, but most of those characters only, and especially the principal ones; and thus we will reach a limit beyond which only such genera will be found, as, on account of important differences from the species of *Ortalis*, cannot any more be united in one family with them. This research has also to show us which among the characters common to the above enumerated species of *Ortalis* have to be

stricken out, or at least to be modified, in order to leave, as a residue, the true characters of the family *Ortalidæ*.

Here also I begin with the European fauna, as the genera and species composing it are by far the best known.

The variously organized groups of species, within the genus *Ortalis*, each have, outside of this genus, a circle of relationship of their own.

1. Forms reminding of *Ortalis lamed*.

If we begin with *Ortalis lamed* (*pulchella* Meig.), we are led at once towards *Sciomyza bucephala* Meig., which Macquart has united, with several other heterogeneous species, in the genus *Otites*, and for which I have later established the genus *Cormocaris*.

*Cormocaris* brings us to *Tetanops*, which agrees in its principal characters with *Cormocaris bucephala*, quite erroneously placed in the genus *Sciomyza* by Meigen. In this species, as well as in all the European species of *Tetanops* which I know of, none of the characters are wanting the presence of which distinguishes the genus *Ortalis*.

The genus *Tetanops* again leads us towards *Dorycera*; the remarkable elongation of the second antennal joint is a peculiar character of most species of this genus, a character not to be found in the species of *Ortalis*. However, the difference in the length of this joint in different species of *Dorycera* sufficiently shows that too much systematic stress ought not to be laid upon this character; all the other characters agreeing with those of the *Ortalidæ*, *Dorycera* must necessarily be placed in this family.

Next to *Dorycera* I find the genus *Adapsilia*, founded by Waga, which, like most *Doryceræ*, has an elongated second antennal joint. It is distinguished by a very projecting front, very approximated antennæ, and the want of ocelli; with the species of *Ortalis* it agrees in the characters already specified, except that the first joint of the ovipositor of the female is not flattened, as in all the species of *Ortalis*, but capsule-shaped, swollen; as, however, in other respects the structure of this ovipositor resembles that of *Ortalis*, *Adapsilia* must also be added to the *Ortalidæ*. At the same time, the statement concerning the shape of the ovipositor of this family must be somewhat modified to be applicable to *Adapsilia*.

I know of no other European genus which, although still more distant from *Ortalis* in the direction of *Adapsila*, would nevertheless be admissible into the family of *Ortaliidæ*.

2. Forms reminding of *Ortalis syngenesiæ*.

If, in our search for forms related to *Ortalis*, we start from *Ortalis syngenesiæ*, distinguished by its four-jointed female abdomen, the genera *Ulidia*, *Timia* and *Platystoma* at once claim our attention.

*Ulidia*, in Meigen's sense, is not a homogeneous genus. *Ulidia demandata* is too aberrant to remain in it. Together with several exotic species allied to it, it has to form a separate genus for which *Chrysomyza*, a name already used by Fallen for *Ulidia demandata*, may be applied.

*Timia apicalis*, described by Meigen, is nothing but an *Ulidia*, and must be referred to this genus; the differences which appear in Meigen's statements and his figures do not exist in nature.

*Timia erythrocephala*, upon which Wiedemann, in the *Analecta*, has founded the genus *Timia*, differs from *Ulidia* only in its extreme glabrousness, its swollen head, much more projecting beyond the eyes in profile, and perhaps also the somewhat less developed clypeus; in all the other important characters both genera agree.

In all the species hitherto placed in the genera *Timia* and *Ulidia*, and consequently also in the species of *Chrysomyza*, the first longitudinal vein is bare. In all other respects, these species share all the characters common to the species of *Ortalis*, so that, in my opinion, their position among the *Ortaliidæ* cannot well be disputed, unless we separate from this family all the species the first longitudinal vein of which is bare. Nevertheless, the relationship between the species of *Ulidia*, *Timia*, and *Chrysomyza* to *Ortalis syngenesiæ* cannot be considered as unusually close, because they differ from it, not only in the bareness of the first longitudinal vein, but also in the presence of a fifth, very much abbreviated, segment of the female abdomen.

A genus agreeing with them in the bareness of the first longitudinal vein, and most closely related to them, is the genus *Empyelocera*, introduced by me.

The genus *Lonchæa* also seems related to *Ulidia*; I will, therefore, in the sequel, explain its systematic location.

The species of *Platystoma* differ somewhat from *Ortalis* in the

shape of the ovipositor: its first joint is smaller, narrower, and somewhat less flattened; generally also more withdrawn in the last abdominal segment. The hypopygium, formed by the upper half of the fifth abdominal segment, is unusually small; whether the penis has the shape of an unrolled tape or thread I cannot ascertain at present, as I have no fresh specimens at hand, but I have every reason to suppose that such is the case, as the female ovipositor, in its structure, is absolutely analogous to that of the species of *Ortalis*. The agreement of all other characters compels us to admit *Platystoma* among the *Ortalidæ*; and this genus really shows, in the four-jointed abdomen of the female, the absence of bristles on the pleuræ and an analogous structure of the mouth, a close relationship to *Ortalis syngenesiæ*.

I know of no other European genera which, in following the same direction of relationship, might be still more distant from *Ortalis* than the species of *Platystoma* are, and which, nevertheless, would show a sufficient agreement with the *Ortalidæ* to be placed among them. I, therefore, hold *Platystoma* to be one the more distant genera, placed on the extreme limit of the family.

### 3. Forms reminding of *Ortalis paludum*.

Species like *Ortalis paludum*, *luctuosa*, and others of the same group, remind of the genera *Psairoptera* and *Cephalia*.

The comparatively low head, the transversely oval eyes, and the small development of the clypeus give *Psairoptera* a very peculiar appearance; nevertheless in all the other important characters it agrees with the species of *Ortalis* so well, that its position among the *Ortalidæ* cannot be disputed, although its precise location within this family may not be very easy to determine. The relationship of *Psairoptera* with the above-named species of *Ortalis*, far from being a close one, can rather be called distant.

In *Cephalia* I cannot discover a single character which would justify its separation from the *Ortalidæ*. To place this genus among the *Sepsidæ* seems to me utterly impracticable, as the distinctive character of the latter family, the rudimentary structure of the palpi, must be maintained, unless we render the limits of the family altogether doubtful. Moreover, *Cephalia* does not show any vestige of vibrissæ which the *Sepsidæ* possess, and more than all, the structure of the ovipositor of *Cephalia* is like

that of the *Ortalidæ*, and not like that of the *Sepsidæ*. *Cephalia* is more closely related to the above-named species of *Ortalis* than *Psairoptera*.

4. Forms not resembling any of Meigen's species.

A fly which possesses all the essential characters of the species of *Ortalis*, and undoubtedly belongs to the *Ortalidæ*, is the *Scatophaga fasciata* of Fabricius, erroneously placed by Meigen in the genus *Trypeta*. The *Musca octopunctata* of Coquebert, Dec. III., Tab. XXIV., is probably identical with it. The circumstance that there is no other European *Ortalida* resembling this species probably caused Meigen to overlook its true relationship. Similar forms are more frequent in other parts of the world, especially in America. Among them I will name *Dictya ocellata* Fabr., *Ortalis vau* Say, and *Platystoma annulipes* Macq., which, by the way, is no *Platystoma* at all.

*Aciphorea not belonging to the ORTALIDÆ.*

That group of genera which, on account of its peculiar, three-jointed, horny ovipositor, ending in a simple point, has been called, and not improperly, *Diptera aciphorea*, is represented in Europe, besides the *Trypetidæ* and those genera which, on the preceding pages, I have claimed for the *Ortalidæ*, only by *Lonchæa*, with the genus *Earomyia*, separated from it by Zetterstedt, and by *Palloptera* and *Toxoneura*. As it would be useless to look for *Ortalidæ* outside of the *Diptera aciphorea*, it remains for us at present to define the position of those genera with regard to the *Ortalidæ*.

The number and position of the frontal bristles, the distinctness of the clypeus, the absence of vibrissæ, and the want of the characteristic bristle on the upper side of the tibia, before its end, which is distinctive of several families, the spurred middle tibia, the spurless front and hind tibiæ, as well as the completeness of the venation, clearly prove the close relationship of these genera with *Ortalis*. They are less closely allied to the *Trypetidæ*, from which they differ in the arrangement of the frontal bristles and in the course of the auxiliary vein. All four differ from all the genera, the location of which among the *Ortalidæ* I have proved in the preceding discussion, by a much smaller size of the two posterior, usually called small, basal cells



of the wings, and all four agree among themselves in the absence of bristles on the first longitudinal vein, and this character they share with some of the genera placed among the *Ortalidæ*.

The genera *Palloptera* and *Toxoneura* possess moreover another striking character, which occurs also among some few of the genera of *Ortalidæ*, but in none to that marked extent; they have, upon the middle of the otherwise short-pilose, thoracic dorsum, as far as its anterior part, a series of binary bristles, distinguished by their length, stoutness, and regular arrangement. The difference in the venation already spoken of, together with this marked peculiarity in the arrangement of the bristles of the thorax, seem to afford sufficient ground for excluding those two genera from the family *Ortalidæ*. I consider them as the nucleus of a separate family, which I call *Pallopteridæ*.

The systematic position of *Lonchæa* is more difficult to decide upon than that of *Palloptera* and *Toxoneura*. While the venation of *Lonchæa* closely approaches these two genera, the position of the bristles on its thorax is more like that of many *Ortalidæ*, as there are no stronger bristles on the thoracic dorsum, anterior to the suture; this genus stands therefore nearer to the undoubted *Ortalidæ* than *Palloptera* or *Toxoneura*. Against its being united with the *Ortalidæ* may be urged (not to mention the smallness of the two posterior basal cells), not so much those characters which are common to all *Lonchææ*, as a number of peculiarities, which do not occur among the *Ortalidæ*, and which distinguish different species of *Lonchæa*, and are quite proper to form the basis of a subdivision of this widespread and rather numerous genus. As such characters I consider the long and strong hairs upon the whole body of some species, the long and dense pubescence of the eyes of others, the partial coalescence of the auxiliary vein with the first longitudinal in several, and finally the circumstance that in the females of some species the sixth abdominal segment does not take part in the formation of the ovipositor quite in the same manner as among the *Ortalidæ*. I am afraid that the *Ortalidæ*, as a family, would lose too many of their well-defined characters, if, in order to accommodate *Lonchæa* among them, we undertook to modify these characters in accordance with the above mentioned peculiarities of the latter genus. The nature of the

venation of the wings having proved, in so many cases, to be the most trustworthy character for the distinction of the families of diptera, we have to take care not to attach too little importance to the smallness of the posterior basal cells in *Lonchæa*, cells which, in the *Ortalidæ*, always are of a considerable size. These reasons induce me to exclude *Lonchæa* from among the *Ortalidæ*. Those entomologists who take the European fauna alone in consideration, will, I have no doubt, justify this course, as that fauna does not contain any intermediate forms between *Lonchæa* and the genera of *Ortalidæ*, but I am not quite as sure of the approbation of those who have a wide acquaintance with the diptera from all parts of the world, because, among the number, forms occur which seem to be intermediate between *Lonchæa* and the genera of *Ortalidæ* allied to *Ulidia*, and it is possible that the discovery of a large number of such forms may, at some future time, render the exclusion of *Lonchæa* from the *Ortalidæ* less plausible than it appears to me now. In the first volume of these monographs, I placed this genus in the family of the *Pallopteridæ* and considered it as the typical genus of a second group in this family. Whether this arrangement, which I for the present retain, is satisfactory, or whether it would not be better to take *Lonchæa* as the typical genus of a separate, small family, intermediate between the *Pallopteridæ* and the *Ortalidæ*, is beyond the scope of the present discussion, and may, therefore, be left for future investigation.

The genus *Earomyia* is so near *Lonchæa*, that, with regard to its systematic position, whatever I said of the latter may be applied to the former.

#### *Summary of the European Ortalidæ.*

From what precedes may be deduced the following list of genera and species of European diptera, which I place in the family of *Ortalidæ*: all the species of *Ortalis*, in Meigen's sense, with the exception of *O. pæcilopectera* and *connexa*; *Sciomyza bucephala*; the genera *Adapsilia*, *Dorycera*, *Tetanops*, *Psairoptera*, *Cephalia*, *Platystoma*, *Timia*, *Ulidia*, *Chrysomyza*, *Empyelocera*, and, finally, *Trypeta fasciata*.

## THE ORTALIDÆ OTHER THAN EUROPEAN.

I will now try to find the genera and species from other parts of the world than Europe, which must be placed in the family *Ortalidæ*.

(a.) *In Wiedemann.*

I begin by the *Ortalidæ* contained in Wiedemann's writings. Besides his species of the genus *Ortalis*, against the location of two of which, however, I will have to raise some doubts, and besides his *Timia erythrocephala*, which occurs in the southeast of Europe and in the neighboring provinces of Asia, the species of *Cephalia* described by him undoubtedly belong to the *Ortalidæ*. They differ somewhat from the European *Cephalia rufipes*, and belong in the relationship of those species which Rob. Desvoidy distributed among his genera *Polistodes* and *Myrmecomylia*: Mr. Macquart has established for them the genus *Michogaster* (better *Mischogaster*), which coincides with the genus *Conopsidea*, introduced by him at a later time.

The two *Ortalis* of Wiedemann, the systematic position of which seems doubtful to me, are *Ortalis trifasciata* and *atomaria*, both from Brazil, both closely related to each other, and somewhat reminding, in their general appearance, of *Richardia* and *Rhopalomera*. Both have an erect bristle before the end of the tibiæ, which I cannot take for anything else but the præapical bristle, wanting in all the *Ortalidæ*. Considering the importance which the presence or absence of this bristle has in the classification of all the *Diptera acalyptera*, I would be very much inclined to exclude both of those species from the family *Ortalidæ*, if I could assign them a fitting place in some other family. The structure of the ovipositor clearly proves that they belong in the circle of the *Diptera aciphorea*, but even in this wider circle the existence of their, however weak, præapical bristle assigns them a rather isolated position. The venation and the position of the frontal bristles, in which they agree with the *Ortalidæ*, do not allow their introduction among the *Trypetidæ*. They have still less connection with the *Pallopteridæ*. Hence, nothing remains to be done, as it seems, but to tolerate them in the family *Ortalidæ*, however unwelcome they may be among them, as, in consequence of their appearance, the absence of a

præapical bristle ceases to be an undoubted distinctive character of the *Ortalidæ*. That these two species, to which several undescribed South American forms have to be added, are to form the nucleus of a new genus is beyond question. I propose for it the name of *Automola*.

Whether the two species of Fabricius, which Wiedemann quotes among the species of *Ulidia*, really belong to this genus cannot be decided without seeing the original specimens; but I have no doubt that they belong to the *Ortalidæ*. I would suppose that *Ulidia stigma* belonged to the genus *Notogramma*, and that *Ulidia ænea* is a *Chrysomya*.

Wiedemann's genus *Pyrgota*, with which *Oxycephala*, Macq. is absolutely identical, shows all the characters of the *Ortalidæ*. It is closely allied to *Adapsilia*, the only difference being that the antennal foveæ are shorter, while in *Adapsilia* they are parallel, and run down to the edge of the mouth; but, as in different species of *Pyrgota* these foveæ vary in length, this difference has so little importance that *Adapsilia* might, without any inconvenience, be united with *Pyrgota*.

The genus *Dacus*, in Wiedemann's writings, is a mixture of many very different forms of diptera, most of which are *Ortalidæ* and two species are *Trypetidæ*. Two of the species of which Wiedemann formed the first section of the genus *Dacus*, form now, together with other species added since, the genus *Stenopterina*, which Macquart established under the name of *Senopterina*, and which he placed quite correctly among the *Ortalidæ*. The *Dacus flavicornis*, placed by Wiedemann in the first division as a third species, has a certain general resemblance to the two former species; it differs, however, in the bareness of the first longitudinal vein and in several other characters, too much to be united in the same genus with them; nevertheless, this species, as well as the two others, belong to the *Ortalidæ*. Among the species of Wiedemann's second division of *Dacus* *D. succinctus* must be referred to the *Ortalidæ*; it belongs in the immediate relationship of *O. syngenesiæ*. *Dacus bicolor* likewise belongs to the *Ortalidæ*. The remaining *Dacus* of Wiedemann's second division are *Trypetidæ*; some of them belong to the genus *Trypeta*, if we take it in the wider sense of Meigen and Wiedemann; for instance, *Dacus parallelus*, fra-

*terculus, serpentinus*; the greatest part of the residue are species which may be left in the genus *Dacus*.

On the other hand, Wiedemann has placed in the genus *Trypeta* several species which do not belong to the *Trypetidæ* at all and have all the characters of the *Ortalidæ*. Such species are: *Trypeta ocellata*, which Macquart described again as a supposed new species, under the name of *Platystoma ocellata*, and upon which Rondani established later the genus *Pterocalla*; *Trypeta obscura*, which is very closely allied to the former, and which Macquart very improperly placed in the genus *Camptoneura*, while its place is in the genus *Pterocalla*, next to *P. ocellata*; moreover *Trypeta picta*, the typical species of the Ortalideous genus *Camptoneura*; *Trypeta flexa*, which may be placed in the genus *Mischogaster*; *Trypeta trimaculata*, redescribed by Macquart as *Cœlometopia ferruginea*; *Trypeta cyanogaster*, *basilaris*, *scutellaris*, and perhaps several others among Wiedemann's *Trypetæ*, which I have not had the occasion to compare.

Those species which Wiedemann placed in the genus *Platystoma*, with the exception of his *Platystoma decora*, really belong to that genus, and consequently to the *Ortalidæ*. *Platystoma decora*, which induced Macquart to establish the genus *Loxoneura*, is also to be placed among the *Ortalidæ*.

*Tetanops sanguiniceps* was described by Wiedemann from a specimen of the Berlin Museum; I have seen this species, unless my memory deceives me, not in the Berlin Museum, but in Wiedemann's collection. I found that in the structure of the head and in the venation it does not sufficiently agree with the European species of *Tetanops* to be left in the same genus with them, but, at the same time, that it undoubtedly belongs to the family of the *Ortalidæ*. I am sure that the *Dichromyia brasiliensis* of Rob. Desvoidy, described as the type of the new genus *Dichromyia*, is the same species.

The *Scatophaga bispinosa* Fab., placed by Wiedemann in the genus *Tetanocera*, differs from the other *Ortalidæ* in the venation as well as in the shape of the scutellum very much, but nevertheless, judging from Wiedemann's statements, and especially from his figure, it undoubtedly belongs in that family, where Macquart also places it in establishing for it the genus *Notacanthina*. Should we judge, however, from Macquart's

figure (in the *Diptères Exotiques*, II., 3, Tab. xxviii., fig. 8), we would not place it among the *Ortalidæ*, as it shows distinctly spurred front and hind tibiæ; these spurs, however, as well as many other things in Macquart's figures, are probably productions of the draughtsman's fancy. In the most slovenly figure of the same species in Macquart's *Suites à Buffon*, no such spurs are to be found.

That *Dacus podagricus* Fab., placed by Wiedemann in *Cordylura*, does not belong to that genus, nor to the *Cordyluridæ* in general, has been recognized long ago. For this species, as well as for similar ones, the genus *Richardia* has been established by Rob. Desvoidy in the family of the *Ortalidæ*.

The systematic location of *Dictya externa* Fab. cannot well be ascertained, owing to the insufficient statements of Fabricius as well as of Wiedemann; the latter are in an insoluble contradiction to Wiedemann's figure in what regards the shape of the head and the picture on the thorax; judging by the figure, it would seem that the fly does not belong to the *Diptera acalyptra* at all.

The genus *Rhopalomera*, Wied. seems to have been by all later authors unhesitatingly referred to the *Ortalidæ*. I look upon this decision as far from unobjectionable, but can very well conceive that a certain resemblance in the shape of the head between the species of *Rhopalomera* and *Platystoma* (with the genera allied to it), may easily have given rise to such an opinion. The species of *Rhopalomera* differ in a striking manner from all the *Ortalidæ* in the structure of the hypopygium of the male, while in this respect they show a most decided leaning towards the *Sapromyzidæ*, *Sciomyzidæ*, and the families immediately connected with them. The females are not provided with a borer-like ovipositor, composed of elongated, retractile joints; the metanotum is but very little developed, less than usual among the *Ortalidæ*; the front and middle tibiæ have, on the upper side, before their end, an erect bristle; upon the upper side of the hind tibiæ, this bristle, in most species, is not distinctly visible among the general pilosity of the tibia; nevertheless, it is easily recognizable in some species, for instance *Rhopalomera pleuropunctata* Wied. Such are the characters which, in my opinion, not only render the location of *Rhopalomera* among the *Ortalidæ* doubtful, but even impossible. If, among the

diptera I am acquainted with, I look for the immediate connections of *Rhopalomera*, I find them unmistakably among the South African species of the genus *Cestrotus*, erected by me. Before all, the striking structure of the head, reminding partly of some genera of *Ephydrinidæ*, partly of the *Ortalidæ*, is very much alike in both genera; this resemblance extends to the mode of pilosity of the face, the shape of the antennæ, and the feathery pubescence of the arista. Moreover, the small development of the metanotum, the shape of the hypopygium, and the structure of the last segments of the female abdomen are very much alike. Now, as the genus *Cestrotus*, through the intermediate steps of *Prosopomyia* and *Physogenia*, approaches the family of the *Sapromyzidæ* very closely, I do not find any serious objection to placing *Rhopalomera* in the same family. That *Rhopalomera* is one of the extreme genera of the family cannot be doubtful; the size of the two posterior basal cells especially distinguishes it from all the other genera of *Sapromyzidæ* in a very striking manner, and connects it with the *Sciomyzidæ*; for this reason it would be also possible, by slightly modifying the definition of the boundary between those two families, to place *Rhopalomera* among the *Sciomyzidæ*. Those who will not share either of these two views, and prefer to place among the *Ortalidæ* a genus which is far apart from all the *Diptera aciphorea* in the structure of the ovipositor, may locate *Rhopalomera* in the vicinity of *Richardia*, on account of the bareness of the first longitudinal vein, the rounded end of the posterior basal cell, and the spines on the femora.

Thus, the following diptera, described in Wiedemann's works, belong to the *Ortalidæ*: his species of *Ortalis*; all the species which he brings in the genera *Timia*, *Ulidia*, *Cephalia*, *Platystoma*, *Tetanops*, and *Pyrgota*; in his genus *Dacus*, the three species in the first division, and *Dacus succinctus* and *bicolor* in the second; in the genus *Trypeta*, *Trypeta ocellata*, *obscura*, *picta*, *flexa*, *trimaculata*, *basilaris*, *cyanogaster*, and *scutellaris*; in the genus *Tetanocera*, his *T. bispinosa*, and finally, his *Cordylura podagrica*.

(b.) *In Robineau Desvoidy.*

I turn now, not without reluctance, to the writings of R. Desvoidy. In his well-known *Essai sur les Myodaires* he united

the genera which we are considering under the general name of *Phytomydæ Myodinæ*. This generalization may be considered as successful, as it contains but little which is foreign, that is which would be better placed among his *Aciphoreæ*, equivalent to the family *Trypetidæ*, and as at the same time it excludes but little of what really belongs to the *Ortalidæ*. The position also which Rob. Desvoidy assigns to the *Phytomydæ Myodinæ*, next to the *Phytomydæ Thelidomydæ*, that is, the *Micropezidæ*, cannot but be sustained, as the latter are closely related to the *Ortalidæ*. After his *Phytomydæ Thelidomydæ* Rob. Desvoidy places his *Aciphoreæ*, that is, the *Trypetidæ*, while he would have done better in reversing this order of his two divisions, on account of the close relationship between the *Ortalidæ* and the *Trypetidæ*. The sovereign neglect of all previous publications, the wretched manner in which most of his genera are established, chiefly upon merely relative differences (for instance, a somewhat longer third antennal joint, a somewhat more pubescent arista, etc.), without regard to the most striking plastic characters, the very slovenly description of many species of unknown *habitat*, etc., have, long ago, put this author's writings in such bad repute that it would not be easy to add anything to it. It would be unjust, however, after this fully deserved blame, not to recognize that Rob. Desvoidy's judgment, with regard to questions of relationship, in this case, as in many others, was a very correct one.

The genera which he places among the *Phytomydæ Myodinæ* are: *Dichromya*, *Palpomya*, *Hesychiella*, *Heramyia*, *Myoris*, *Oscinis*, *Blainvillia*, *Meckelia*, *Meliera*, *Myennis*, *Strauzia*, *Vidalia*, *Delphinia*, *Acidia*, *Myrmecomyia*, *Polystodes*, *Stylophora*, *Herina*, *Myodina*, *Richardia*, *Rivellia*, *Boisduvalia*, *Clidonia*, *Setellia*, *Chlorophora*. Concerning these genera and their names, I will offer the following remarks:—

The genus *Dichromya* (the name ought to be improved to *Dichromyia*) is adopted by Macquart in his *Diptères Exotiques*, and placed among his *Heteromyzides*. The *Dichromyia brasiliensis* of Rob. Desvoidy is the same as the *Platystoma microcera* of Macquart's *Suites à Buffon*, and was described still earlier as *Tetanops sanguiniceps* by Wiedemann. Not being a *Tetanops* this species must therefore be considered as the type of the genus *Dichromyia*. The position among the *Ortalidæ*,



assigned to it by R. Desvoidy, I hold to be correct; with *Platystoma* it has nothing to do.

The genus *Palpomya*, a hybrid name, being formed out of a Latin and a Greek word, and not rendered more valuable by its improvement in *Palpomyia*, is identical with *Platystoma*; the typical *Palpomyia Lalandi* is nothing else but the well-known *Platystoma asphaltina* Wied. The generic characters given by R. Desvoidy are entirely erroneous.

Under the name of *Hesyquillia* Rob. Desvoidy describes *Platystoma seminationis* Fab., and under that of *Hesyquillia lugubris* the *Platystoma umbrarum* Fab.; thus, the genus *Hesyquillia* likewise coincides with *Platystoma*.

The genus *Heramyia*, which ought at least to be called *Heramyia*, is based upon *Sciomyza bucephala*, which R. Desvoidy did not recognize, as well as upon another species which is very like it, if not identical. Macquart united this species with *Myoris* (a name which it is difficult to explain), a genus not distinguished by a single character of any value, and with *Blainvillia* (a preoccupied name), and thus formed his genus *Otiles* (a name which Latreille had already used in a broader sense); but he placed in it moreover some true *Sciomyzidæ*.

The genus *Oscinis*, as understood by R. Desvoidy, is identical with *Dorycera*; it has nothing in common with the genus of the same name to which Fallen reduced the much more comprehensive genus *Oscinis* of Latreille.

*Meckelia* (an already preoccupied name) and *Melierea* (probably also a dedication name), contain species belonging to Macquart's Ortalideous genus *Ceroxys*.

The genus *Myennis* (a badly formed name), is established for *Scatophaga fasciata* Fab., which Macquart, in the *Suites à Buffon*, describes as *Ortalis fasciata*, after Rob. Desvoidy, and, for a second time, as *Tephritis fasciata*, after Meigen.

*Strauzia* (as the genus is dedicated to Strauss-Dürkheim, the name should be spelt *Straussia*) does not belong to the *Ortalidæ* at all, but to the *Trypetidæ*; the two species described by Rob. Desvoidy are nothing else but the male and female of *Trypeta longipennis* Wied., which Rob. Desvoidy did not recognize.

*Vidalia* seems likewise to belong to the *Trypetidæ*; not

having succeeded yet, however, in identifying the species, I am not positive about it.

The genus *Delphinia* is established for *Trypeta picta*, Fab., which Rob. Desvoidy did not recognize; the unbecoming generic name was afterwards replaced by *Camptoneura* Macq.

The genus *Acidia* belongs to the *Trypetidæ*.

*Myrmecomya* (more correctly *Myrmecomyia*) and *Polystodes* (better *Polistoides*) taken together nearly correspond to the genus *Michogaster* (better *Mischogaster*) of Macquart, placed by the latter among the *Sepsidæ*. The size of the palpi and the structure of the ovipositor do not justify this location, and the genus undoubtedly belongs to the *Ortaliidæ*.

Of the position of the genus *Stylophora* in the system I cannot judge, not knowing the species upon which it is based.

*Herina* (the derivation of the name is not apparent) comprises species from the relationship of *Ortalis paludum*.

The genus *Myodina* (again a name of obscure derivation) is based upon *Ortalis vibrans*, which R. Desvoidy took for *Ortalis urticae*. Macquart, in the *Suites à Buffon*, very erroneously united this genus with *Ortalis*, throwing together various very different species. Long before Rob. Desvoidy, Kirby had used for *Ortalis vibrans* the generic name of *Seioptera*.

*Richardia* is founded either upon *Dacus podagricus* Fab., not recognized by Rob. Desvoidy, or else on some closely allied species.

*Rivellia* (probably a dedication name) contains species related to *Ortalis syngenesiæ*, and among them this very species, as usual, not recognized by Rob. Desvoidy. Macquart in the *Suites à Buffon* unites *Rivellia* with *Herina*, while the species really belonging to it are put in the genus *Urophora*, or even in *Platystoma*; and upon one of them, in his later works, he even establishes a new genus, *Epidesma*.

Whether the genus *Boisduvalia* really differs from the preceding only in the length of the third antennal joint seems very doubtful; should this be the case, the separation of these two genera would not be justified.

*Clidonia* is considered by the author himself as belonging to quite a different family, in which we will not contradict him.

*Setellia* seems to contain *Ortaliidæ* resembling *Micropezidæ* in their general appearance.

*Chlorophora* may also belong there, as Rob. Desvoidy especially mentions its relationship to *Setellia*.

The following among Rob. Desvoidy's genera belong therefore to the *Ortalidæ*: *Dichromyia*, *Palpomyia*, *Hesychiella*, *Heramyia*, *Myoris*, *Oscinis*, *Blainvillia*, *Meckelia*, *Meliera*, *Myennis*, *Delphinia*, *Myrmecomyia*, *Polistoides*, *Herina*, *Myodina*, *Richardia*, *Rivellia*, *Boisduvallia*. Very probably *Setellia* and *Chlorophora* have to be added to them. The systematic position of *Stylophora* is doubtful. Genera not belonging to the *Ortalidæ* are: *Straussia*, *Vidalia*, *Acidia*, *Clidonia*.

(c.) *In Macquart.*

During his long career as an entomological writer, Macquart has several times changed his views with regard to the classification of the *Diptera acalyptra*, as was to be expected from the great difficulty of the subject. His opinion, however, on the extent of the family *Ortalidæ* has, during that time, undergone but little change. As, strictly speaking, he is the only writer who has attempted to establish a general system of the diptera, embracing all parts of the world, I consider it as my duty to give a detailed account of his views, the more so as they differ from mine in a not unimportant manner. To attain this end I will enumerate all those of his families, with their genera, which, according to my opinion, contain genera belonging to the *Ortalidæ*, as well as to the families closely connected with them, for instance, *Palloptera*, *Toxoneura*, *Lonchæa*. In order to show the progress made by Macquart during his dipterological studies I will give this in a twofold manner, that is, first after the *Suites à Buffon* and next after the *Diptères Exotiques*. Those genera which I consider as undoubtedly *Ortalideous* I have marked with an exclamation; those doubtfully introduced into this family I have designated by an interrogation. The genera related to the *Ortalidæ*, which I have united in the family *Pallopteridæ*, I have inclosed in brackets; the same I have done with the genus *Sapromyza*, because Macquart does not separate the species of *Palloptera* from the *Sapromyzæ*, although the typical *Sapromyzæ* have no relationship whatever with the *Ortalidæ*.

The review of the part of the system above alluded to, from the *Suites à Buffon*, is as follows:—

<i>Scatomyzidae.</i>	! Amethysa,	<i>Thyreophoridae.</i>
Scatophaga,	! Notacanthina,	Thyreophora.
Dryomyza,	Rhopalomera,	
(Sapromyza,)	! Eurypalpus,	<i>Leptopodidae.</i>
(Toxoneura,)	! Platystoma,	Tanypeza,
Sciomyza,	! Loxoneura.	Calobata,
Lucina,		Tæniaptera,
Helomyza,	<i>Tephritida.</i>	Micropeza,
Blephariptera,	Dacus,	Nerius,
Heteromyza.	Leptoxys,	Longina,
	Bactrocera,	! Setellia.
<i>Psilomyda.</i>	! Senopterina,	
Orygma,	Petalophora,	<i>Ulidini.</i>
Trigonometopus,	Urophora,	Actora,
Eurina,	Terellia,	Cœlopa,
Psilomyia,	Tephritis,	Gymnopoda,
! Tetanops,	Acinia,	Lipara,
! Pyrgota,	Ensina.	! Ulidia.
! Otites,		
Platycephala,	<i>Sepsida.</i>	<i>Lauzanidae.</i>
! Dorycera.	Sepsis,	Lauzanina,
	Cheliggaster,	Pachycerina,
<i>Ortalia.</i>	Nemopoda,	(Lonchæa,)
! Herina,	! Cephalia,	(Teromyia,)
! Ortalis,	! Michogaster,	Pterodontia,
! Ceroxya,	Diopsis.	Celyphus.
Cleitamia,		

In the *Diptères Exotiques* the corresponding part of the system assumes the following shape, about which I have only to observe that in this work Macquart brings in only those genera in which he intended to describe, or at least to mention, exotic species; the genera *Toxoneura*, *Lucina*, *Tetanops*, *Otites*, *Platycephala*, etc., although not mentioned in this list, ought, in order to render it complete, to be transferred to it from the former.

<i>Scatomyzidae.</i>	Sciomyza,	<i>Ortalia.</i>
Scatophaga.	Helomyza,	! Oxycephala,
	Curtonotum.	! Loxoneura,
<i>Sciomyzidae.</i>		! Platystoma,
Dryomyza,	<i>Psilomyda.</i>	! Camptoneura,
Tapeigaster,	! Eumetopia,	! Heterogaster,
(Sapromyza,)	Eotecephala,	Rhopalomera,
Physegenna,	! Dorycera.	! Euripalpus,

! Eniconeura,	Cardiaca,	Sepsis.
Cleitamia,	Dacus,	
! Richardia,	! Meracantha,	Diopsidæ.
! Senopterina,	Bactrocera,	Diopala.
! Herina,	Enicoptera,	
! Epidesma,	Ceratita,	Leptopoditæ.
! Ceroxys,	Acanthoneura,	Longina,
! Ortalis,	Urophora,	Nerius,
! Amethysa,	! Toxura,	Cardiaca,
! Lamprogaster,	Tephritis,	Calobata,
! Euprosopia,	Terellia,	Toxopoda,
! Coslometopia,	Acinia,	Tanypeza,
! Notacanthina,	! Epicerella,	! Setellia.
! Cruphiocera,	Ensina.	
! Plagioccephala,		Lauzanidæ.
! Campigaster.	Sepsidæ.	(Lonchæa.)
	! Cephalia,	Lauzanis,
Tephritidæ.	! Omalocephala,	! Ulidia,
! Odontomera,	! Conopsida,	Zygothrica,
Leptoxys,	Nemopoda,	Celyphus.

In the *Diptères Exotiques*, after the families I have enumerated the *Helomyzidæ* and *Geomyzidæ* follow, and after them the

#### *Heteromyzidæ.*

Heteromyza,  
Actora,  
! Dichromyia,  
Coslopa.

In examining the systematic distribution, introduced by Macquart in the *Suites à Buffon*, we soon find that as early as that work, he had, if not a definite knowledge, at least a correct instinct of the true characters of the *Ortalidæ*, less correct, however, than Rob. Desvoidy, who wrote before him.

Those genera which, in that work, he united in the family *Ortalidæ* really belong to it, with the exception of *Rhopalomera* and, very probably, of *Cleitamia*; the latter genus seems to be hardly distinct from *Henicoptera*, which belongs to the *Trypetidæ*.

A double error seems to be contained in the separation of the genera *Tetanops*, *Pyrgota*, *Orites*, and *Dorycera* from the *Ortalidæ* and their combination with *Orygma*, *Trigonometopus*, *Eurina*, *Psilomyia*, and *Platycephala* into one family, the *Psi-*

*lomydæ*. Their relationship with the *Ortalidæ* is evident. Among the genera which Macquart places in one family with them, *Eurina* and *Platycephala* belong to the *Oscinidæ*, each of the others to some other dipterous family; none shows any close relationship to the *Ortalidæ*. In the *Diptères Exotiques* Macquart has in part corrected this error, as at least *Oxycephala*, of the identity of which with *Pyrgota* he was not aware, is put among the *Ortalidæ*.

A second error is that the ortalideous genus *Stenopterina* (Macquart incorrectly writes *Senopterina*) has been placed in his family *Tephritidæ*. In the *Diptères Exotiques* Macquart has amended this error.

A third mistake consists in Macquart having placed in his genus *Urophora* several species which do not at all belong to his family *Tephritidæ*; his *Urophora quadrivittata*, *fulvifrons*, and several others, are true *Ortalidæ*.

Fourthly, the position of the genera *Cephalia* and *Michogaster* (better *Mischogastra*, or at least *Mischogaster*) among the *Sepsidæ* cannot be sustained. As has been observed already, we agree with Rob. Desvoidy in considering both as true *Ortalidæ* on account of the large development of the palpi as well as of the structure of the ovipositor.

Neither can I, in the fifth place, agree with Macquart in putting *Setellia* among his *Leptopodidæ*; I refer it also to the *Ortalidæ*, and this once more in agreement with Rob. Desvoidy.

A sixth error is the great interval between *Ulidia* and the other *Ortalidæ*, as well as the whole composition of the family *Ulidini*. *Lipara*, with which Macquart's genus *Gymnopoda* is synonymous, belongs to the *Oscinidæ*; *Cælopa* and *Actora* do not belong to the same family, neither with *Lipara*, nor with *Ulidia*, nor together. In the *Diptères Exotiques* Macquart did rightly in dropping altogether the ill-conceived family of *Ulidinæ*.

I will not expatiate here on the incorrectness of the position of *Palloptera*, *Toxoneura*, *Lonchæa*, and *Teremyia* (established for *Lonchæa laticornis*), as this inquiry is of no especial importance to us.

It is easy to perceive that the system is improved in the *Diptères Exotiques*; but even here *Dorycera* is misplaced among the *Psilomydæ*, together with *Eumetopia* (which belongs to the *Ortalidæ*).

In his family *Tephritidæ* the genus *Odontomera* is established, which is closely related to *Cœlometopia* on one side and *Setellia* on the other, and must therefore be transferred to the *Ortalidæ*.

The same may be said of the genus *Meracantha*, the true place of which is in the vicinity of *Odontomera*, *Setellia*, *Cœlometopia*, *Richardia*, etc.

The genus *Toxura*, judging from the published figure, also belongs to the *Ortalidæ*, and indeed in the circle of relationship of *Pyrgota*; whether the examination of the insect itself would lead to the same result I do not pretend to affirm, as I have not seen it.

The figure of the head of *Epicerella* (*Dipt. Exot.*, Suppl. iv., Tab. xxvii.) might perhaps justify the supposition that the genus belongs to the *Ortalidæ*; nevertheless I think it more probable either that the frontal bristles, characteristic of the *Trypetidæ*, were broken off in Macquart's specimen, or that they have been omitted in the drawing. Thus I do not dare to express any opinion as to the correctness of the position assigned by Macquart to this genus.

*Cephalia*, in the *Diptères Exotiques*, is likewise put among the *Sepsidæ* instead of among the *Ortalidæ*.

*Omalocephala* (better *Homalocephala*, at all events, a preoccupied name) seems to belong in the vicinity of *Setellia*, *Cœlometopia*, etc., that is, in the family *Ortalidæ*.

The genus *Conopsidea*, as Macquart informs us, is founded upon *Cephalia femoralis* Wied.; in the *Suites à Buffon*, this same and two more species gave him occasion to establish the genus *Michogaster*. If these two data be correct, as we have every reason to suppose, *Conopsidea* would be a synonym of *Michogaster*; the emendation of the incorrectly formed name *Conopsidea* thus becomes useless.

The erroneous location of *Setellia* at the end of the *Leptopodidæ* is preserved.

*Ulidia* is transferred to the family *Lauxanidæ*, where it is a perfect stranger.

About the systematic position of *Zygothrica* (not *Zygotricha*, as Gray, in the *Animal Kingdom*, spoils, in trying to improve it), a genus already proposed by Wiedemann in his essay on *Achias*, I can only form an opinion from the statements of Wiedemann and Macquart on the typical species, *Z. dispar*, as well as from

their figures. It seems to me that this species may belong to the *Drosophilidæ*. In the Berlin Museum there is a little fly which apparently belongs to this genus; I have not been able to ascertain whether this species is *Z. dispar*, but I have seen enough not to doubt in the least of its belonging to the *Drosophilidæ*.

*Dichromyia* is wrongly placed by Macquart among the *Heteromyzidæ*, between *Actora* and *Cælopa*. I will maintain for the present its position among the *Ortalidæ*, although I cannot deny that a better place might perhaps be found for it; however, no such place has been pointed out yet. Besides the typical species, *Dichromyia sanguiniceps*, Macquart has another species from Africa, which, as I will show hereafter, cannot well belong to this genus.

About the genera which Macquart, in the *Diptères Exotiques*, places in the family *Ortalidæ*, I will make the following remarks:—

*Oxycephala*, as was mentioned before, is identical with *Pyrgota*.

*Loxoneura* is established for *Platystoma decora*.

*Platystoma* is misused for the location of a number of heterogeneous forms; whatever had broad wings, with a dark picture, among the rest a *Trypeta*, was taken by Macquart for a *Platystoma*.

*Camptoneura* is a true ortalideous genus, based upon *Trypeta picta* Wied., and, as observed above, identical with *Delphinia* Rob. Desv. Macquart has likewise used this genus for the introduction of species not belonging there at all, for instance, of *Trypeta obscura* Wied.

*Heterogaster* (a preoccupied name) is a well founded genus in the neighborhood of *Pyrgota*.

*Euripalpus* (a hybrid name), judging from Macquart's data, belongs to the *Ortalidæ*.

The genus *Eniconeura* (better *Heniconeura*) is said to be distinguished by its spurless middle tibiæ. If such were really the case the genus could not belong to the *Ortalidæ*, nor to any of the allied families. But in *Heniconeura fenestralis* Macq., I perceive at the end of the middle tibiæ a rather strong spur, which is closely applied to the tarsus when the latter is stretched



out. There cannot be any doubt, therefore, that the genus really belongs to the *Ortalidæ*.

*Richardia*, in the *Diptères Exotiques*, is with good reason entirely separated from *Herina*, with which it was united in the *Suites à Buffon*.

*Senopterina* (I have already corrected the name to *Stenopterina*) has been placed here where it really belongs, among the *Ortalidæ*.

*Herina* is a mixture of heterogeneous forms, which must be generically kept apart.

*Epidesma* is probably synonymous with *Rivellia* R. Desv.; moreover, Macquart has placed species of the latter genus under the head of *Herina*, of *Urophora*, and even of *Ceroxys*.

*Ceroxys* is a rather well founded genus, established at the expense of *Ortalis* Meig. But in the *Diptères Exotiques* Macquart adds species to it which do not at all share its characters; for instance *Ceroxys cærulea*, etc. It almost seems, in such instances, that he mistakes this genus for another.

The genus *Ortalis* is a mixture of heterogeneous species; how is it possible to crowd together in one and the same genus such species as *Ortalis ornata* Meig., *fasciata* Fab., *connexa* Fab., *frondescentiæ* Lin., *vibrans* Lin., and even the *Ortalis dentipes* Macq., said to be provided with spurs on the hind tibiæ? Either Macquart has not known these species or he has not closely examined them, otherwise he could not possibly have committed such a mistake; how very confused his ideas about the systematic position of these species was, appears from the fact that he described *Scatophaga fasciata* Fab. as an *Ortalis*, and for a second time as *Tephritis* and that *Dictya connexa* Fab. even appears three times in his writings, as *Cordylura*, as *Ortalis*, and as *Tephritis*! (*Dipt. Exot.*, Suppl. iv., p. 292, *Tephritis dorsalis*.)

The true characters of *Amethysa* are not to be gathered from Macquart's definition of this genus. As the name alludes to the color of the African species, upon which the genus is established, it should be improved to *Amethysa*.

*Lamprogaster* is a well founded genus; but the species belonging to it show considerable differences in their organization which would fully justify a subdivision in several genera. It belongs in the vicinity of *Platystoma*.

*Ceolometopia* seems to be founded on *Trypeta trimaculata* Fab., which Macquart did not identify; it is closely allied to *Odontomera* and *Setellia*.

*Euprosopia* undoubtedly belongs to the *Ortalidæ*.

*Notacanthina* is founded upon *Tetanocera bispinosa* Fab.

The figure of the head of *Cruphiocera* (better *Cryphiocera*) seems to indicate that the species would be better placed in some other part of the system, as it has strong bristles on the forehead; the other characters, however, prove that its location among the *Ortalidæ* cannot well be called in doubt.

The position of *Plagiocephala* among the *Ortalidæ* likewise cannot be doubted; it seems closely related to *Richardia*, which also contains broad headed species.

*Campigaster* (a frightful compound) is undoubtedly well placed among the *Ortalidæ*, but the name cannot be preserved in its present shape.

(d.) *In Walker.*

Although Macquart's publications do not always define with sufficient precision the systematic position of the genera introduced by him, this position could, in most cases, be made out, and moreover, the attempt, on his part, of a systematic distribution is always apparent. Walker's publications on exotic diptera do not, unfortunately, deserve this praise. The systematic department, as well as everything else in them, is treated with the same superficial carelessness. In most cases it would be impossible to make out, from his statements, the real place in the system which the genera, introduced by him, must occupy, unless they were accompanied, as is often the case, by the excellent figures of Westwood. These usually furnish the necessary data concerning the relationship of the new genera; they would have done so in all cases if Westwood's attention had been directed to the sometimes very minute characters which are used in the classification of the diptera and especially of the *Diptera acalyptera*; the fact that in the majority of cases these characters are reproduced in the figures, give a most brilliant proof of the accuracy of Westwood's drawings, and of his keen perception.

Walker's publications in the *List of Dipt. Ins. of the Brit. Mus.*, and in the *Insecta Saundersiana*, do not raise our expectations very high, as the *Ortalidæ* and *Trypetidæ* are mingled together

generally; forms such as *Camptoneura picta* Fab., *Trypeta arcuata* Walk., *T. albovaria* Walk., *T. excepta* Walk., etc., are certainly no *Trypetidæ*! In Walker's later publications, the systematic confusion is still greater. \*As far as I can ascertain, among the genera published in the latter, *Adrana*, *Brea*, *Valonia*, are *Ortalidæ*; the two latter belong in the vicinity of *Platystoma*. The genera *Themara*, *Strumeta*, *Sophira*, and *Rioxa* belong to the *Trypetidæ*. The genus *Xangetina* is closely related to *Physo-genia*, perhaps identical with it, and hence, has to be placed among the *Sapromyzidæ*. The position of the genus *Xiria* remains doubtful, even in the presence of Westwood's figure; it shows some characters which make one doubt that it belongs to the *Diptera aciphorea* at all. The genera *Duomyia* and *Chromatomyia*, which, taken together, seem to correspond to *Lamprogaster* Macq., and *Zona*, which is apparently identical with *Loxoneura*, are *Ortalidæ*; Walker, in the *List of Dipt. Ins.* etc., has erroneously placed them among the *Tachinidæ*, together with *Trigonostoma*, which likewise belongs to the *Ortalidæ* (however, he corrected this error in one of his later publications.)

(e.) *In Bigot, Gerstæcker, Doleschall and Saunders.*

In recent times it is to Bigot and Gerstæcker that the increase of our knowledge of exotic diptera is principally due.

The genera *Terastomyia*, *Maria*, *Agastrodes*, and *Pterogenia*, established by Bigot, belong to the *Ortalidæ*. *Elassogaster* likewise, although placed among the *Helomyzidæ* by Bigot, must be referred to the *Ortalidæ*. His genus *Elaphromyia*, on the contrary, if description and figure be correct, belongs to the *Trypetidæ*.

Gerstæcker has established the ortalideous genera, *Phytalmia*, *Gorgopis*, *Toxotrypana*, and *Diacrita*, and described several new species of *Richardia* and *Mischogaster*. *Phytalmia* has a synonym in Saunders's genus *Elaphomyia* (*Elaphomyia Wallacei* Saund. = *Phytalmia megalotis* Gerst.; *Elaphomyia cervicornis* Saund. = *Phytalmia cervicornis* Gerst.). The genus *Gorgopis* seems, as the author himself supposes, to be synonymous with *Zygænula paradoxa*, described somewhat earlier by Doleschall. If in the genus *Toxotrypana* the outer row of frontal bristles is really wanting, and it thus should really belong to the *Ortalidæ*, the not flattened ovipositor of this genus would place it in the

neighborhood of *Pyrgota*, with which it also agrees in the small development of the clypeus. However, the ocelli are fully developed, and the structure of the head is rather like that of the true species of *Dacus*, as *Dacus oleæ*, etc., so that it might perhaps be considered as a genus of this group, in which, in conformity to the striking shortness of all the hairs of the body, the lateral bristles of the front have disappeared. This supposition seems confirmed by the scutellum which has only two bristles at the tip; and the uncovered last abdominal segment of the female, which is generally wanting in the *Dacina*, or is altogether concealed under the preceding segment, is not a positive objection, as this segment is very much abbreviated and much less horny than the preceding ones, and thus can very easily be concealed in the living insect.

Among the scattered publications of various authors many forms may be found which belong to the *Ortaliidæ*. I purposely omit what I know of them, especially the gradually published species of the genera already discussed by me. It is not in my power to collect the residue, and I doubt whether such a work would materially alter the limits of the family *Ortaliidæ* as they have resulted from the preceding discussion.

#### NATURAL CHARACTERS OF THE FAMILY ORTALIDÆ.

If we ask now what we have to erase or to modify in the characters of the original genus *Ortalis*, in Meigen's and Wiedemann's sense, in order to obtain the characters defining the whole family, the answer will be that it is very little indeed. In the first place, the mention of the pilosity of the front must be modified a little, as there are genera among the *Ortaliidæ* which have no other bristle before the bristles of the vertex. Next to that, the description of the structure of the feet has to be changed thus, that in most genera they are short and strong, but in some rather elongate. In the third place, the statement about the female abdomen must be modified by saying that it has generally five segments, but that the fifth is very often shortened and concealed under the fourth, and that, in some cases, it entirely disappears, and then the abdomen has only four segments. In the fourth place, the introduction of *Pyrgota* and of the related genera in the family, requires a modification in the statement about the structure of the ovipositor, which is not flattened here; the chief

stress in this statement should be laid upon the remainder of the structure, which is the same in all the genera. In the fifth place, the mention of the bristles on the first longitudinal vein should not be admitted in the definition of the family.

The definition of the *Ortalidæ* can therefore be put in the following manner: Front broad in both sexes; on both sides of the vertex a more or less developed swelling runs down the front, upon which, before the bristle of the vertex, one or two erect bristles are inserted, which, however, are wanting in some genera. Otherwise the front has only the ordinary pubescence, or is quite bare, but never provided with a second row of strong bristles along the orbit, even when the hairs on both sides of the *vitta frontalis* almost acquire, in some few genera, the character of bristles. Frontal fissure distinct; frontal lunule never pushed so far up as to appear to be a part of the front; even in those genera in which, on account of the great curvature of the frontal fissure, as in *Ædopa*, the lunule happens to lie higher than the antennæ, it always distinctly appears as a part of the face; in many genera it is not distinguishable from the face. The vibrissæ are always wanting. The eyes are bare. The clypeus is always distinct, of various size, usually well developed. Proboscis more or less stout. Palpi rather broad, often very broad, very seldom narrow. Metanotum larger than usual, strongly projecting posteriorly and inferiorly. Feet generally rather stout and short, in some genera, however, of a considerable, although not striking, length and slenderness. Middle tibiæ distinctly spurred; front and hind tibiæ spurless; no erect preapical bristle before the end of the upper side of the tibiæ. The abdomen of the male has four segments, however the first consists of two coalescent segments, which is also the case in the females; the but little developed fifth segment represents a small, more or less imbedded hypopygium; the tape-like or thread-like penis is of an extraordinary length, rolled up in a spiral. The female abdomen consists of five segments, the fifth of which is often very much abbreviated, sometimes wanting, so that the abdomen of the female then seems to consist of only four segments; the sixth, seventh, and eighth segments of the abdomen are converted into the three telescope-like, extensile joints of the ovipositor, ending in a simple, hairless point; in most cases the ovipositor is flattened, and then its first joint often differs but little in its nature

and coloring from the preceding abdominal segments. The wings show the complete venation of the *Diptera acalyptera*; the auxiliary vein is entirely separated from the first longitudinal vein, although often very much approximated to it; it runs into the costa at a more or less acute angle, without becoming indistinct at its end; the two posterior, so-called small basal cells, are of a rather considerable size.

#### RELATIONSHIP OF THE ORTALIDÆ.

The great variety of forms occurring among the *Ortalidæ* accounts for the number of their near or distant connections among other families. A relationship of the first degree, which finds its most distinct expression in the similarity of the structure of the male hypopygium and of the female ovipositor, connects them with the *Trypetidæ* and the *Pallopteridæ*, as well as these two families with each other. All three form a very close circle of relationship, the members of which have very similar habits.

The *Ortalidæ* differ from the *Trypetidæ* in the absence of a second, external row of frontal bristles, and in the course of the auxiliary vein, which, in the *Trypetidæ*, is obliterated at the end and turns rather abruptly, at a more or less right angle, towards the costa.

From the *Pallopteridæ*, the *Ortalidæ* differ in the more considerable size of the two posterior basal cells.

A relationship of the second degree connects the *Ortalidæ* with the *Sepsidæ* and *Calobatidæ*, as well as these families with each other. Both differ from the *Ortalidæ* distinctly in the structure of the male hypopygium and the want of a horny, three-jointed ovipositor, ending in a simple, hairless point. The *Sepsidæ* differ moreover in their rudimentary palpi from the *Ortalidæ*, as well as from the *Calobatidæ*.

With those of the closely related families which, among their characters, have an erect preapical bristle before the tip of the tibiæ, and, at the same time, do not have any vibrissæ, that is, with the *Sapromyzidæ* and *Sciomyzidæ*, the *Ortalidæ* have only a very distant relationship. I would have left it unmentioned if the genus *Rhopalomera*, which I consider as belonging to the *Sapromyzidæ*, had not been placed among the *Ortalidæ*. The presence of an erect bristle before the end of the tibiæ, the different structure of the hypopygium in the male, the absence of an

ovipositor, similar to that of the *Ortalidæ*, sufficiently distinguish the *Sapromysidæ* and *Sciomyxidæ*.

#### DIAGNOSTIC OR ARTIFICIAL DEFINITION OF THE ORTALIDÆ.

The statements about the relationship of the *Ortalidæ* prove that the following characters are sufficient to distinguish this family from all the others, in other words, to constitute its artificial definition.

Male with a rolled-up, long penis; female with a three-jointed, horny ovipositor, ending in a simple point. Front without a second lateral row of bristles. No vibrissæ. Complete venation of the *Diptera acalyptra*; auxiliary vein distinct to its very tip, ending in the costa at an acute angle; the two posterior basal cells large. The middle tibiæ alone are provided with spurs; all the tibiæ are without an erect bristle before the end of their upper side.

## II.

### SYSTEMATIC DISTRIBUTION OF THE ORTALIDÆ.

THE last, but not the easiest, task which it remains for me to fulfil is the systematic distribution of the family *Ortalidæ*. In attempting it, I will principally confine myself to those genera and species which I possess in my own collection. Only in exceptional instances, and with especial caution, will I allow myself to transgress the limit of what I have, or have had, before me, as the statements concerning the other genera and species which have been published are seldom complete enough to afford the necessary data for the discrimination of their position in the system.

In order to obtain a preliminary survey I first divide the *Ortalidæ* in two large divisions; to the first belong those which have the first longitudinal vein beset with bristles or hairs; to the second, those the first longitudinal vein of which is bare.

#### FIRST DIVISION.

##### ORTALIDÆ WITH A BRISTLY OR HAIRY FIRST LONGITUDINAL VEIN.

Among the European *Ortalidæ* of this division five diverging forms will easily be noticed: 1. *Adapsilia*; 2. *Ortalis* Meig., of course to the exclusion of *O. syngenesiæ* and *vibrans*; 3. *Platystoma*; 4. *Cephalia*; and 5. *Scatophaga fasciata* Fab.

All the other European genera with a bristly first longitudinal vein can be grouped around these five types, with the exception perhaps of the somewhat recalcitrant genus *Psairoptera*. The same may be said of all the exotic *Ortalidæ* of this division which I know of. Thus, the *Ortalidæ* of the first division may be naturally divided into five groups.

We will characterize these groups only after having made out the genera which belong to them, and we will proceed to the discovery of these genera by means of the principal characters which distinguish the above-mentioned five types.



*Adapsilia* shows a striking character, distinguishing it from all the others, in the absence of ocelli and the not flattened ovipositor.

*Scatophaga fasciata* with its broad and low head, the circular shape of its third antennal joint, and the considerable distance intervening between the end of the auxiliary vein and that of the first longitudinal, has a general appearance which differs from the four other types so much that for a long time the close relationship of this species with the others was, for this reason, misunderstood.

*Ortalis*, *Platystoma*, and *Cephalia* differ in a very marked way in the mode of insertion of the bristles upon the pleuræ.

*Ortalis* has a strong bristle immediately above the basis of the fore coxæ; this bristle is not extant in *Cephalia* and *Platystoma*.

*Cephalia* has above the middle coxæ, but below the longitudinal suture of the pleuræ, a strong bristle, which is also present in *Ortalis*, but entirely wanting in *Platystoma*. If, for the sake of brevity, I call the first *prothoracic*, the second *mesothoracic bristle*, the difference between these three genera will be as follows: *Ortalis* has a prothoracic and a mesothoracic bristle; *Cephalia* has the mesothoracic bristle only; in *Platystoma* both are wanting.

#### *First Section: Pyrgotina.*

I borrow the name of this group from the genus *Pyrgota* Wied., to which *Adapsilia* is most closely related. Both genera agree in the absence of ocelli, in the projecting front, the prolonged second antennal joint, the retreating face, the comparatively but little developed clypeus, the prolongation of the first abdominal segment in both sexes, and the contraction of the following segments in the female, as well as in the capsule-shaped structure of the first joint of the ovipositor, and in several other subordinate characters.

The principal difference between these genera consists in the structure of the antennal foveæ, which, in *Adapsilia*, run down in a parallel direction as far as the edge of the mouth, and are separated by a straight ridge, while in *Pyrgota* they end at some distance from the edge of the mouth, and are more or less coalescent.

The South-African genus, *Hypotyphla*, founded by me, agrees

with *Pyrgota* and *Adapsilia* in the want of ocelli, and resembles *Adapsilia* very much in the structure of the face; but it differs in the but inconsiderable elongation of the first abdominal segment, in the greater length of the other segments of the female abdomen, and especially in the long, elongated-conical, but not flattened ovipositor.

Judging by the figure which Macquart gives of his *Toxura maculipennis*, I must suppose with a considerable degree of probability, that it likewise belongs in this circle of relationship.

I have no doubt that the interesting genus *Toxotrypana* Gerst., if placed in the family *Ortalidæ*, would find its location in the section *Pyrgotina*, on account of its not flattened ovipositor, its hairy first longitudinal vein, and the small development of its clypeus. The presence of ocelli, the enormous length of the ovipositor, and the elongation of the posterior angle of the anal cell into a very long lobe distinguish this genus from the other genera of the group in a most marked manner. I have already alluded to the fact that this genus shows some characters which would seem to justify its location not among the *Ortalidæ* at all, but among the *Trypetidæ* of the group *Dacina*.

Mr. Macquart has established the genus *Heterogaster* for a South-African species. As the name he gave to this genus was preoccupied a long time ago, I replace it by the name of *Sphenoprosopa*. This genus is very like *Adapsilia* in the structure of the head; in the profile it projects considerably in front of the eyes: the middle of the face forms a high and straight ridge descending perpendicularly; alongside of it the antennal foveæ, which are further from the middle than usual, descend perpendicularly to the edge of the mouth. The cheeks are very broad. The oral opening is very small, the clypeus but little developed, and the proboscis not incrassated. *Sphenoprosopa* differs from *Adapsilia*, *Pyrgota*, and *Hypotyphla* by the presence of distinct ocelli, the great elongation of the third antennal joint, which nearly reaches the edge of the mouth, the enormous development of the last segment of the abdomen of the male, very approximated cross-veins, very parallel longitudinal veins, and a not acute posterior angle of the anal cell. The first and third longitudinal veins are distinctly bristly. I have no doubt that *Sphenoprosopa* belongs to the *Pyrgotina*, although, on the other hand, I must acknowledge that several of the above-

quoted characters seem to point towards a relationship with *Platystoma*. But I am prevented from laying much stress upon them by the small development of the clypeus and the not incrassated proboscis, characters which are not usual in the circle of relationship of *Platystoma*.

The typical species of the genus *Dichromyia*, proposed by Rob. Desvoidy, is Wiedemann's *Tetanops sanguiniceps* from Brazil. Macquart afterwards described a second species, *Dichromyia caffra*. I cannot approve of these two species being united in the same genus. The front of *D. caffra* is much shorter, and anteriorly it does not project as much in the profile as in *D. sanguiniceps*; moreover the ocelli are wanting here, while the other species has them, and the vertical diameter of their eyes is much longer than the horizontal, while in *D. sanguiniceps* the horizontal diameter exceeds the vertical; the scutellum is convex, and the tegulæ very large, while *D. sanguiniceps* has a flat scutellum and small tegulæ. Whether the longitudinal veins are beset with bristles in the same manner in both species or not, I cannot state positively; in *D. caffra* the first and third veins are very distinctly beset with hairs; in *D. sanguiniceps*, if I remember right, the first vein is beset with a hardly perceptible pubescence, but I cannot positively affirm that such is the case. But without insisting upon this difference, the others are sufficient to justify a generic separation. For this reason I have established for *D. caffra* Macq. a species generally found on an offensively smelling plant, the new genus *Bromophila*.

As to the final decision about the place of the American genus *Dichromyia*, I must leave it in abeyance until I have an opportunity to examine both sexes of *D. sanguiniceps*.

The ovipositor of the species of *Bromophila* is much more retracted than in the other genera of the present group; and although not flattened, it is not at all incrassated; unfortunately I have not been able to ascertain on any female specimen whether the ovipositor ends in a simple point, as it seems to me it does. Should this not be the case, the genus would not belong to the *Ortalidæ* at all. At present I cannot find a better place for it than in the neighborhood of *Pyrgota*.

I know of no other genera belonging to the *Pyrgotina*. At present, therefore, the section is composed as follows:—

1. PYRGOTA Wied.; 2. ADAPSILLA Waga.; 3. TOXURA Macq.;

4. *HYPOTYPHILA* Lw.; 5. *TOXOTRYPANA* Gerst.; 6. *SPHENOPROSOPA*, Lw.; 7. *BROMOPHILA*, Lw.; and 8. *DICHROMYIA*, R. Desv. The final decision about the location of *Toxotrypana*, *Bromophila*, and *Dichromyia* is, of course, reserved.

The characters common to these eight genera are: oral opening small; proboscis not incrassated; clypeus but little developed; no bristle upon the broad cheeks, and no bristle immediately over the fore coxæ; the first longitudinal vein hairy; the costal vein soon attenuates beyond the end of the third longitudinal vein. The ovipositor is not flattened.

*Second Section: Platystomina.*

The name of this section is derived from *Platystoma* Meig., the oldest and best known genus in it.

PLATYSTOMA is represented in Europe by a number of closely allied species which must be considered as typical. We may entertain different views on the extent of the genus *Platystoma*, still we would not be justified in introducing in it, as has often been done, species which, in the majority of the most important characters, differ from the European *Platystomæ*. In fact, most of the exotic species, described by different authors as belonging to *Platystoma*, do not belong to it at all.

The *Dictya decora* Fabr., identical with *Tephritis violacea* Gray, and placed by Wiedemann among the *Platystomæ*, has the posterior angle of the anal cell drawn out into a long lobe; this character at once distinguishes this species, not only from *Platystoma* proper, but from all the genera closely related to it. Macquart was right in establishing the new genus *LOXONEURA* for it. Walker afterwards called it *Zona*. Judging from the figure of the head of *Loxoneura decora*, in profile, given by Macquart in the *Diptères Exotiques*, this genus must belong to the *Platystomina*; the absence of the pro- and mesothoracic bristles, and the only four-jointed abdomen of the female confirm the correctness of this location; the fore femora are spinous.

Whether the South-American *Platystoma stictica* Fab. really belongs to *Platystoma* is very doubtful.

Only a few of the species, placed by Macquart in the genus *Platystoma* really belong there, for instance, none of his American species. *Platystoma fascipennis* and *ocellata* are *Ortalidæ*, but belong to the *Pterocallina*, not to the *Platystomina*. *Platy-*

*stoma lunulata* belongs, unless the figure of the head is entirely incorrect, to the *Trypetidæ* and not to the *Ortalidæ*. The same may be said of *Platystoma latipennis*, of which Macquart does not give the *habitat*, but which is American.

In the same way as those species of Macquart, Walker's *Platystoma australis*, from Australia, does not belong to this genus. It seems even that not one of the Australian *Platystomæ* hitherto described is a real *Platystoma*, and that this genus is confined to the three old continents.

Should we even confine, as we must necessarily do, the genus *Platystoma* to those species only which agree with the European species in the formation of the head, in the venation, and in the peculiar picture of the wings, we will find species in it which show some, and not unimportant, plastic differences. To the European species, the arista of which has only a short pubescence, may be opposed African species, some of which have the arista perfectly bare, and the scutellum very much swollen, with only four bristles upon it (for instance, *Platystoma asphaltina* Wied.); others, on the contrary, with a feathery arista. The latter are again divided in species, in which, as in the European species, the scutellum has six bristles, and the femora are unarmed (for instance, *Platystoma nigronotata* Lw.); and in such the scutellum of which has four bristles, and the front femora of which, on the under side, towards the tip, are armed with a few little spines. The latter, and among them *P. pectoralis* Lw., differ moreover from the former in the usually more metallic coloring of the conspicuously broad abdomen, the upper half segments of which have a much harder consistency than in the other species; and besides, in such species, the two parts of the first abdominal segment, which represent the first two abdominal segments of other diptera, are not completely coalescent. It results from the foregoing that *Platystoma* may easily be subdivided in four smaller genera, which can be distinguished by the following characters :—

1. Arista bare; femora unarmed; scutellum swollen, with four bristles; type: *P. asphaltina* Wied.
2. Arista with a very short pubescence; femora unarmed; scutellum moderately convex, with six bristles; type: *P. umbrarum* Lw.

3. Arista feathery; femora unarmed; scutellum moderately convex, with six bristles; type; *P. nigronotata* Lw.

4. Arista feathery; front femora spinous; scutellum but little convex, with four bristles; type: *P. pectoralis* Lw.

As in the remaining parts of the organization there is a great deal of agreement among all the *Platystomæ*, and as at the same time the number of the described species is not large enough to require a further subdivision of the genus, we may leave it undivided for the present. Walker's genus *VALONIA* is closely allied to *Platystoma*. Unfortunately, I possess only a single male of *Valonia complicata* Walk., which, moreover, is not very well preserved. The structure of the head, the thorax, and the feet, as well as the venation, do not show anything which would justify a generic separation from *Platystoma*. The facts that the second longitudinal vein is a little shorter, and more curved forward, and that the small crossvein is a little nearer the end of the discal cell, are evidently not sufficient for such a course. The very much swollen and apparently only too bristly scutellum, as well as the moderate breadth and smooth surface of the upper abdominal segments, would furnish a better ground for a separation from *Platystoma*. At all events, thus much is evident, that *Valonia* does not show any distinctive characters more important than those of the four genera would be in which, as I have shown above, *Platystoma* might be subdivided.

*Platystoma cincla*, from Port Jackson, described by Guérin (*Voyage de la Coquille*), may be considered as the type of a separate genus, allied to *Platystoma*. Several Australian and African species are closely connected with it. If I remember right, such species are designated in the Berlin Museum by the new generic name of *Pachycephala*. But as a genus *Pachycephalus* exists already, I propose the name *SCHOLASTES*. Such species differ from *Platystoma* in the head being larger, the front much broader, the portion of the face between the fovæ much more excavated, and the much narrower clypeus not protruding; the occiput likewise is much less swollen, so that the head is much more closely applied to the thorax, and appears entirely sessile in the profile; the thorax is much broader and flatter; the scutellum likewise, much larger and flatter, but with six bristles; the tegulæ are as much developed as in *Platystoma*. The structure of the abdomen and of the feet, as well as the venation,

do not show any important difference from *Platystoma*; still it is worthy of notice that the under side of the front femora is beset with a row of little black bristles, which in the larger species assume the shape of slender spines. The coloring of the body is generally ochre, or ferruginous-yellow, usually with black longitudinal stripes on the thorax; the picture of the wings consists of numerous black spots, which often coalesce into cross-bands. In *Scholastes cinctus* Guér., and the species from Australia allied to it, the first half of the arista is feathery, the second bare, and on the thoracic dorsum there are two rather distant rows of short, but strong bristles. The African *Scholastes*, as the type of which I consider *S. nepticula* Lw., from Guinea, have the whole arista bare and no trace of rows of bristles on the thorax. These characters may afford a ground for dividing *Scholastes* in two genera, in which case the present generic name would have to remain with the genus containing *S. cinctus* Guér.

Another genus, closely related to *Platystoma*, containing, as it seems, exclusively Australian species, is the genus *LAMPROGASTER* Macq., with which *Chromatomyia* Walk. is synonymous. The structure of the thorax, of the abdomen, and of the feet, as well as the venation, are very much in agreement with *Platystoma*. The tegulæ are large, larger than those of most *Platystomæ*. The structure and the arrangement of the bristles of the front are likewise similar to those of *Platystoma*; only the third antennal joint is much longer; not only are the antennal foveæ also longer, but deeper and more sharply defined, on their inside especially; the clypeus is of the same breadth as in *Platystoma*, but not projecting; the palpi usually towards their end are not as broad as in *Platystoma*, and the occiput is less swollen; the scutellum is strikingly swollen and provided with six bristles. The abdomen of all the species is of a brilliant metallic color, which the scutellum and the middle of the thorax often share with it; on the latter, however, the metallic color is generally concealed by the presence of pollinose longitudinal stripes, and of an appressed pubescence of a light color. Otherwise, the coloring of the thorax generally is brown or chestnut-red, which color, in many specimens, also extends over the scutellum; the coloring of the wings consists of a few black spots. All the known species of *Lamprogaster* have unarmed femora and a bare arista;

in general, their plastic characters are so much alike that I cannot point out any peculiarity, among the species I know of, which might give rise to a generic subdivision.

Next to *Lamprogaster* stands a genus of which *Senopterina decora* Macq., from Tasmania, may be considered as the type; I call it *EUCHALCOTA*. The front is of about the same breadth as in *Lamprogaster*, but is flatter and altogether furrowed-scribulate. The third antennal joint is still longer here; the sharply defined, deep antennal foveæ are once and a half the length of those of *Lamprogaster*, and reach almost altogether as far down as the front part of the lateral edge of the mouth; the arista is beset with a short pubescence near its basis, otherwise bare; the clypeus is perceptibly narrower; the occiput is less swollen, so that the head is more closely applied to the thorax. The latter is strongly built, but not as broad in the region of the wings, and hence, of a more equal breadth; scutellum convex, but not swollen, provided with six bristles. The venation is similar to that of the preceding genera, but differs in the fourth vein being gently curved forward before its end, and in the third vein being gently bent backward, so that the first posterior cell is distinctly attenuated towards its end. The coloring of thorax and abdomen is altogether metallic. In thus defining the characters of the genus, I have taken in consideration some species from Australia, which can very well be placed in the same genus with the above named typical species; nevertheless, they show the following differences: the wings are comparatively longer and without any picture, while in *Euchalcota decora*, the cross-veins have dark borders alongside of them; there are no other bristles in front of the row of bristles along the posterior part of the thoracic dorsum, while in *E. decora*, there are some few shorter and thinner bristles immediately in front of that posterior row. There is no necessity for a generic separation yet. I cannot identify any of my species from Australia in a satisfactory manner; it may be that *Chromatomyia laeta* Walk. belongs here.

It would be difficult to explain why Macquart places *Euchalcota decora* in his genus *Senopterina*. The structure of the face and the shape of the thorax are entirely different. The comparatively narrow abdomen of the male (I have not seen the other sex) is almost the only point of resemblance.



The genus *DUOMYIA*, of Walker, is probably closely allied to the above named two genera. Its definition is too insufficient to enable us to form a trustworthy opinion. The irregularly formed name cannot possibly be preserved.

Two species closely related to each other, belonging to the section *Platystomina*, Macquart (in the *Dipt. Exotiques*) has described as *Tephritis caerulea*, and *strigipennis*. With several other Australian species, very similar to them, they can be united in a genus which may be called *CELETOR*. The very striking characters of this genus are the following: The structure of the body is *Trypeta*-like, with the exception, however, of the head. Front of an equal breadth, very steep and long, so that the antennæ are situated much deeper than in any other genus of the present group; the front is evenly and rather densely pilose; the bristles of the vertex and the lateral bristles, closely approximated to them are rather stout; the ocelli are near the edge of the vertex and closely approximated to each other; the two bristles, which otherwise are near them, are wanting here. Antennæ short, hardly reaching beyond the middle of the face; their third joint of equal breadth, with an acute anterior angle; antennal arista slender, bare. Middle portion of the face concave; clypeus rather broad, projecting; proboscis stout; palpi rather broad towards their end. Eyes very high and narrow; cheeks broad; the lower part of the occiput strongly turgid. Thorax strongly developed, rather of an equal breadth; scutellum turgid, overhanging the perpendicular metathorax, with six bristles. Abdomen with four segments in both sexes, as in the preceding genera; the last segment of the female abdomen generally of a softer consistency. The first joint of the ovipositor flattened, always entirely protruding, suddenly attenuated near the basis, more gradually towards the tip, thus having an almost oval outline. Wings rather large, broad towards the basis; the auxiliary vein lies very near the first longitudinal, its end, however, diverges from it at an obtuse angle towards the costa, and preserves its distinctness and stoutness to the very tip. Otherwise, the venation is not unlike that of *Platystoma*, *Lamprogaster*, etc., only the small crossvein is beyond the last third of the discal cell, a position somewhat reminding of *Valonia* Walk. The coloring of the body is blackish-blue, seldom verging on greenish; the front red or reddish-brown; the lateral borders

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with white pollen; wings hyaline; all the four species known to me have crossbands, connected near the anterior margin, thus forming an inverted  $\Delta$ , and with a third black band, bordering the apex; moreover, near the basis of the wing there is a large spot in the shape of a band, or numerous black spots which form a kind of network, not unlike that of some species of *Petalophora*. This difference in the picture of the wings is accompanied by some plastic differences which, if the number of species were larger, could serve for a subdivision in two genera. Those species which have the large spot in the shape of a crossband near the basis of the wings have at the same time the lateral parts of the face very broad, while they are very narrow in the species which have the picture in the shape of a network; the former have the posterior angle of the anal cell smaller, the latter larger than a right angle, so that in the former, the angle is a large acute one, in the latter, a small obtuse one. One of the species from Australia in my collection, belonging to the second group, is distinguished by the very abnormal structure of the hind tibiae of the male. Among the species already published, besides the two described by Macquart, and mentioned above as typical, *Ortalis trifasciata* Doleschall, from Amboina, may likewise, perhaps, belong to the genus *Ceutor*.

Macquart, in the *Diptères Exotiques*, describes as *Eniconeura violacea* a species distinguished by some peculiar characters, which undoubtedly is to be considered as the type of a distinct genus of *Platystomina*. The name *Eniconeura*, or more correctly *Heniconeura*, cannot be retained, as it has been already used by Macquart himself for a genus of *Bombyliidae*. The genus may be called *CLITODOCA*. According to that author it inhabits the East Indies; but this statement may perhaps be erroneous, as I have seen a fly said to be from Guinea, and in which I think I recognize Macquart's species; there is a slight difference in the picture of the wing, as represented on Macquart's figure, but the agreement of the description is perfect, and seems fully to justify my supposition. By all means the species is a *Clitodoca*. The characters of *Clitodoca* may be put down as follows: head large, almost square, with a very short longitudinal diameter; antennae narrow, descending to the middle of the face; arista with a distinct pubescence; face concave, its lateral portions very narrow; oral opening very large, broader than long; clypeus not

disciform, but representing a swelling of the gula, and hence, reminding of a similar structure in *Loxoneura*, in which it fills the greater part of the oral opening. Proboscis but little swollen; palpi of a moderate breadth. Thorax very stout. Abdomen comparatively very short and narrow, consisting of four segments. Feet long; wings very large; the end of the auxiliary vein almost obliterate; the second longitudinal vein very strongly bisinuate; the third and fourth strongly convergent towards their end; the posterior crossvein very oblique; all the basal cells very long; the anal cell has an acute posterior angle.

Among the species which Wiedemann places in the genus *Ortalis*, there are three closely allied ones, which do neither belong in the genus *Ortalis*, nor in the group *Ortalina*. They have to form a separate genus in the group *Platystomina*, which I will call *ENGISTONEURA*. They are: *Ortalis moerens* Fab., *parallela* Wied., and *lugens* Fab.; *Trypeta albobaria* Walk., may be added as a fourth species, unless it is synonymous with *O. moerens* Fab., which may possibly be the case. The following characters distinguish the genus *Engistoneura*. They are large flies of yellowish coloring, with a very much developed thorax, especially broad between the roots of the wings; its convexity, however, is very small; the abdomen is comparatively small, of a metallic violet color. The structure of the head somewhat reminds of *Dacus*. The antennæ reach the middle or a little below the middle of the face; the long arista is distinctly feathery. The foveæ, which reach a little below the middle of the face, are very sharply defined. Clypeus distinct; proboscis of moderate stoutness, with a but little developed mentum; palpi rather broad. Scutellum large, but little convex, overhanging the metathorax more than in most of the other genera of the *Platystomina*; it has six bristles. Abdomen rather cylindrical. Feet of moderate length and not very strong; the front femora on the under side, in the vicinity of the tip, with a few bristle-like spines. Wings large, rather narrow towards the basis, broad towards the apex; auxiliary veins of moderate length, turning abruptly towards the costal margin, and becoming almost obliterate; the first longitudinal vein approaches closely to the margin beyond the end of the auxiliary vein, and runs alongside of it as far almost as the end of the second longitudinal vein; the third longitudinal vein is strongly bent back-

ward, the fourth vein slightly forward, so that the first posterior cell, very broad in the middle, is rather narrow at the end; the small crossvein is beyond the middle of the discal cell; the two posterior basal cells are of a rather considerable and equal length; the posterior angle of the anal cell is rounded. The extensive picture of the wings forms, in the vicinity of the apex, more or less regular crossbands.

The genus *AMPHICNEPHES*, which I have established for a North American species, will be characterized in the sequel. It is somewhat like *Platystoma*, but distinguished by the not swollen occiput, the flat scutellum, provided with only four bristles, the broad wings and the striking divergency of the longitudinal veins.

A pretty *Ortalida* from Cuba, which cannot conveniently be placed in any of the existing genera, gave occasion for the establishment of the genus *HIMEROËSSA*, which I will characterize below among the other North American genera. It is distinguished by the narrowness of the marginal and submarginal cells; moreover, the posterior crossvein is prolonged inside of the first posterior cell.

*Ortalis syngenesiæ* Linn. is the type of a very well justified genus, existing in Europe, Africa, Asia, and America, which Rob. Desvoidy called *RIVELLIA*. Although the name is not particularly well chosen, the objections against it are not serious enough for its rejection. Besides the species described by Rob. Desvoidy, the following belong to the genus *Rivellia*: *Trypeta basilaris* Wied., *Dacus succinctus* Wied., *Ceroxys quadrisciata* Macq., *Ortalis Ortoeda* Walk., *Tephritis melliginis* Fitch., and several others. Most of them agree quite well with the species placed in the genus *Rivellia* by Rob. Desvoidy; others, however, show a very gradual transition towards allied forms, which cannot very well be united in the same genus with the typical *Rivelliæ*. Thus Macquart has established for one of them the genus *Epidesma*. The transitions, however, are so gradual, that it is not very easy to decide upon the best boundary for the genus *Rivellia*. *R. viridulans* R. Desv., and all the North American species which I know of, agree in their generic characters with *Rivellia syngenesiæ* completely; the same is the case with *R. basilaris* Wied., and with several *Rivelliæ*, from the southeastern region of Asia, which I possess in my collection;

the only difference shown by the latter species is a somewhat smaller length of the third antennal joint. Next to these are some South African *Rivellia*, for instance, *Rivellia atra* Lw., which have the third antennal joint a little shorter still; all these species, however, cannot be separated from *Rivellia*, as the diminution of the third antennal joint is a very gradual one, not affording any distinct limit for a separation.

Macquart's *EPIDESMA fascipennis*, from the Cape, is likewise but very little different from the typical *Rivellia*. The occiput is somewhat more convex; the third antennal joint has a somewhat sharper anterior angle, the thorax is comparatively a little smaller, and the first section of the fourth longitudinal vein shows but very little of the sinuosity, so characteristic of the true *Rivellia*, and which renders the anterior part of the discal cell more narrow; at the end of the convex scutellum there are two strong bristles; whether the second pair of bristles, which exists in the other *Rivellia*, is wanting here, or whether they were accidentally broken off in the specimen I had before me, I am unable to decide; I rather incline to favor the former supposition. If I am right, *Epidesma* would deserve to be retained as a separate genus; in the opposite case, it would be better to place *Epidesma fascipennis* in the genus *Rivellia*, because then the whole difference between them would merely consist in comparative characters.

Among the species from the southeast of Asia, there are several which are closely allied to *Rivellia*, but differ from the typical species in the greater length and lesser breadth of the marginal cell, a more straight third longitudinal vein, and a hardly perceptible sinuosity of the first section of the fourth vein; moreover, the thorax is less strongly developed, so that their stature shows some, although only a distant, resemblance to the species of *Stenopterina*. They are easily distinguished by the picture of their wings, which is very different from that of the *Rivellia*; it consists in a conspicuous black border along the costal margin and the apex, not unlike that of *Diacrita* and *Molanoloma*, while the *Rivellia*, besides the apex, which is margined with black, also have black crossbands. I propose for this genus the name of *SCOTINOSOMA*.

Species having the first section of the fourth longitudinal vein straight, must, most decidedly, be eliminated from *Rivellia*.

Such is a group of closely related African species, which I unite in the genus ARDELIO. The lateral portions of their face are distinctly broader than in *Rivellia*, the eyes not so high, and the cheeks, for this reason, broader; the clypeus is narrower and the thorax more strongly developed; the convex scutellum has four bristles, like *Rivellia*. They almost show more affinity to *Platystoma* than to *Rivellia*; all the species known to me are black, with longitudinal lines of white dust on the thorax, and their wings have black crossbands, between which, along the costal margin, there are black spots or streaks. The single species show, in the length of the third antennal joint, still more considerable variations than the species of *Rivellia*, and it almost seems that, in this respect, they might be divided in two sections, one of which would be represented, as a type, by *Ardelio longipennis* Lw., the other by *A. brevicornis* Lw.

The genus EPICAUSTA, established by me for two African species, is less allied to *Rivellia* than to *Stenopterina*, which will be discussed below. These species are like *Stenopterina* in their stature, but are not so slender; the head is not unlike that of the species of *Dacus* proper; the antennæ are not quite as long as in *Stenopterina*; the fore coxæ are much shorter, and not so movable; the thorax, seen from the side, is not attenuated in front, as is the case with *Stenopterina*; the scutellum has four bristles, as in the latter genus; the wings are conspicuously shorter, and the last section of the fourth longitudinal vein is much more bent forward. The small crossvein is not oblique, as in all *Stenopterinae*, but perpendicular. The picture of the wings, in both of the species known to me, consists only in a large black spot at the tip.

STENOPTERINA, a genus proposed by Macquart in the *Suites à Buffon*, is well founded, as long as it is confined to the species of the immediate relationship of *Dacus brevicornis* Fab. and *æneus* Wied. Unfortunately the same author, in the *Diptères Exotiques*, has entirely left out of sight the characters of this genus, established by himself, and has introduced in it a number of heterogeneous forms, and, at the same time, placed in the genus *Herina* species which either belong to *Stenopterina* or are more closely related to it than to any other genus. His *Stenopterina femorata* and *immaculata*, both from Bourbon, seem to belong rather to *Epicausta* than to *Stenopterina*;

*Stenopterina decora* Macq. is, as has been observed above, the typical species of the genus *Euchalcota*; *S. gigas*, *scutellaris*, and *nigripes* of Macquart, all three from Tasmania, are certainly no *Stenopterina*æ. There would be more ground to place in that genus the *Ortalis violacea* of Macquart, which is probably correctly identified in the Berlin Museum with *Dacus macularis* Fab. *Herina mexicana* Macq. also belongs to *Stenopterina*, and *H. calcarata* Macq., although perhaps not a true *Stenopterina*, is closely related to that genus. The three species described by Walker (*List of Dipt. Ins.*), *bicolor*, of unknown origin, *trivittata*, from the Philippine Islands, and *basalis*, from Australia, do not seem to have anything in common with true *Stenopterina*æ. A true *Stenopterina* is *S. submetallica* Lw., from Mozambique; and *Herina chalybea* Doleschall, belongs probably to the same genus.

As I will have to characterize *Stenopterina* in detail among the North American genera of *Ortali*dæ, it will suffice here to indicate the principal characters. Head resembling that of *Dacus* in structure; occiput convex, but not swollen. Front of a considerable and even breadth. Antennæ long and narrow, generally descending a little beyond the anterior edge of the mouth, which is somewhat drawn upwards; clypeus broad; proboscis stout. Thorax narrow; the pectus ascending obliquely in front, so that the thorax, seen from the side, is rather conspicuously attenuated anteriorly. Fore coxæ remarkably long, inserted unusually near the neck and very movable in this insertion. Scutellum with four bristles. Abdomen narrow; wings long and narrow; little crossvein oblique, placed beyond the middle of the long discal cell; the third and fourth longitudinal veins, in the majority of the species, are somewhat bent towards each other, so that the first posterior cell becomes narrower towards its end. In all the species I know of, the stigma, as well as a border between it and the apex, and the first basal cell, up to the small crossvein, are tinged with brown; in most species the posterior crossvein has likewise a dark border.

The next genus to be mentioned here is the genus *MISCHOGASTER* Macq., founded upon *Cephalia femoralis* Wied. *Mischogaster pernix* and *diffusus* Gerst., belong to it. It differs from *Cephalia* in the absence of a mesothoracic bristle, and in the face, which does not project inferiorly; from the following genus it is

distinguished by the first abdominal segment being beset with bristles. This character, as well as the somewhat advanced position of the anterior ocellus, remind of the *Richardina*. The face is rather short and somewhat excavated.

The last genus which I place among the *Platystomina* forms the transition from this group to the *Cephalina*, and shows a good deal of approximation to the genus *Cephalia*. As the typical species of this genus I consider *Cephalia myrmecoides* Loew. Besides the want of a mesothoracic bristle, this genus differs from the true *Cephalia* in the fact that the first abdominal segment is so coarctate in its middle that its anterior part forms a knot-shaped swelling; moreover, the shape of the body is still more slender; the wings still narrower and still more cuneiform towards the basis, so that the anal angle and the alula disappear entirely, whereas in *Cephalia*, there is at least a rudiment of them. The statements which Rob. Desvoidy makes about his genus *Myrmecomyia* render it probable that the above-mentioned species belongs to this genus. Certainty in this case is not possible, without the comparison of the species upon which Rob. Desvoidy established the genus. Not wishing to run the risk of introducing a useless generic name, I prefer to use the name of *MYRMECOMYIA* for my species. The pleonastic name which the species thus obtains, *Myrmecomyia myrmecoides*, is not good, but may be tolerated in view of the fact that nothing is more like an ant than this dipteran.

A review of the genera which I placed among the *Platystomina* shows that, besides the bristles upon the first longitudinal vein, and the absence of prothoracic and mesothoracic bristles, which define this group, these genera have the following characters in common: The oral opening is very large; the clypeus generally very much developed, and the proboscis proportionally stout; the third antennal joint is elongate; the thoracic dorsum bristly upon its hind part only; the female abdomen has four segments, as the fifth is either altogether wanting, or only rudimentary and then completely hidden under the fourth segment.

#### *Third Section: Cephalina.*

I call this group after the genus which was first made known in it. It differs from the *Platystomina* in the presence of a



metathoracic bristle, from the *Ortalina*, in the absence of the prothoracic one. With the former it moreover agrees in the larger size of the oral opening, the greater development of the clypeus and the stouter proboscis; with the latter it has the more or less distinct development of the fifth segment of the female abdomen in common. While some of the genera show a very close affinity to the *Platystomina* in general appearance, others stand as near to the *Ortalina*, so that the *Cephalina* seem to form a transition from the first to the second of those sections.

The genus *CEPHALIA*, introduced by Meigen, shows some affinity to those genera of *Platystomina*, the species of which are distinguished by their slender shape, especially to the genera *Mischogaster* and *Myrmecomylia*. It necessarily must be confined to those species which, like the typical *Cephalia rufipes* Meig., have a mesothoracic bristle. The species added later to it, although in their general shape and their coloring they more or less resemble the true *Cephalinæ*, do not show the necessary agreement with them in those characters which are the most trustworthy in the establishment of the genera of *Ortalidæ*. They belong in the group *Platystomina* and principally in the genus *Mischogaster*, in part also in the genus *Myrmecomylia*. The genus *Cephalia*, in this narrower sense, does not contain as yet any American species. As, for this reason, I will have no occasion to refer to it again, I will characterize it here:—

Body slender, abdomen narrow at the basis, its first segment without any knot-shaped swelling; feet rather long and slender. Hairs on the body extremely short; thorax with a few small bristles on the lateral and the posterior portions only; the bristles before the scutellum and its own lateral bristles are very short.

Antennæ long and slender; their second joint short. Face shield-like, convex, without antennal foveæ.

Palpi very broad; proboscis rather stout and mentum somewhat swollen.

Wings attenuated towards the basis in the shape of a wedge, with a very narrow alula; the second longitudinal vein hardly sinuose at all; the third and fourth longitudinal veins normal in their course; the anterior basal cell of equal breadth; the first longitudinal vein bristly towards its end only; the crossveins rather distant from each other; the picture of the wings usually

consists of an infuscation of the stigma and of a black spot on the apex.

*Cephalia* is immediately connected with a genus embracing *Trypeta flexa* Wied. and the genera related to the latter. As this genus does not coincide with any one of the hitherto adopted genera, it must receive a new name. I call it *TRITOXÆ*, the name alluding to the peculiar picture of the wings. The *Tritoxæ* differ from the *Cephalinæ* in the presence of a strong bristle before the end of the fore tibiæ, on their upper side, and in the presence of a weak indication of antennal foveæ, especially, however, in the fact that the third and fourth longitudinal veins have an irregular course, in consequence of which the anterior basal cell is expanded before its end; moreover also in the first longitudinal vein being, to a great extent, covered with bristles and in the approximation of both crossveins to each other. The wings have a dark coloring and the picture consists of three oblique, more or less arcuated, hyaline crossbands. The other characters the genus *Tritoxa* shares with the genus *Cephalia*.

After *Tritoxa* *CAMPTONEURA* naturally follows. The typical species is the well-known North American species, described by Fabricius as *Musca picta*, and afterwards erroneously placed by Wiedemann in the genus *Trypeta*. Rob. Desvoidy was the first to found a new genus for it, which he called *Delphinia*; Macquart established later for the same species the genus *Camptoneura*, which thus coincides with *Delphinia*. As the name *Delphinia* cannot be retained for reasons of priority, Macquart's name must be adopted. *Camptoneura* differs from *Tritoxa* in a striking manner in the structure of the wings; they are broad, and show, on the costal margin, near the end of the auxiliary vein, a shallow, but very striking excision; the third longitudinal vein is very remarkably sinuate, and the anal cell rounded at the end. The picture of the wings has a distant resemblance to that of the species of *Aciura*.

The other genera of *Cephalina* which I know of contain species of a less slender stature than the three genera which I have just examined.

Among them the genus *PIARA*, founded by me for an African species, is remarkable for its close relationship to the *Platystomina*. It may be characterized as follows:—

Body rather robust, the bristles upon the vertex, upon the posterior part of the thorax and upon the scutellum long.

Antennæ of medium length; the anterior corner of the third joint acute; arista feathery. Face excavated above, and with a projecting bump below.

Oral opening broader than long; proboscis very stout.

Wings rather broad; longitudinal veins diverging; the first, third, and fifth beset with bristles; posterior angle of the anal cell not acute; the picture of the wings is not unlike that prevailing in the genus *Acitura*.

Rather closely related to *Piara* is the genus *TRAPHERA*, which I propose to establish with *Ortalis chalybea* Wied. for its type. It also stands very near the *Platystomina* and may easily be considered as one of them, as the mesothoracic bristle is but very little conspicuous and the fifth segment of the female abdomen is also very much abbreviated. The principal differences between *Traphera* and *Piara* lie in the structure of the head and of the wings. The head of *Traphera* is not unlike that of *Platystoma*, but the lower part of the occiput is but very little turgid; the vertical diameter of the eyes is very long, the horizontal, on the contrary, very short; the first two antennal joints are short; the third pointed oval; the arista feathery; the face is descending obliquely, excavated under the antennæ, convex below; the clypeus is very much developed, its vertical diameter rather large, the horizontal one small; proboscis very much incrassated. Thorax stout and convex; its dorsum is provided with bristles only on the sides and posteriorly. Scutellum generally with eight bristles. Wings comparatively short and broad, with bristly hairs on their anterior margin; the whole of the first longitudinal vein is strongly bristly and shows, in the vicinity of the somewhat obliterate end of the auxiliary vein, a peculiar break; the basal half of the third longitudinal vein is beset with bristles; the posterior crossvein is oblique, so that the posterior angle of the discal cell is very acute; the anal cell is rounded at the end and its posterior angle withdrawn in a peculiar manner. The wings are of a dark color, marked with pale bands starting from the posterior margin and abbreviated in front.

While both of these genera are very near the *Platystomina*, the two which we have yet to mention approach the *Ortalina*. They are: *DIACRITA*, introduced by Gerstæcker, and a genus to be

adopted for *Ortalis marginata* Say, for which I propose the name of IDANA.

*Diacrila* is easily distinguished from *Idana* by the shape of the posterior angle of the anal cell, which is drawn out in a very long lobe, and by the picture of the wings, which consists only in a very broad dark border, extending to the very apex of the wing. The more extended picture on the wings of *Idana* is not unlike that of *Pteropæcila* and the posterior end of its anal cell forms only a short angle. As both genera contain North American species, I will have occasion to refer to them again more in detail.

#### Fourth Section: *Ortalina*.

The *Ortalina* have a prothoracic, as well as a mesothoracic bristle, while among the *Cephalina*, the former, among the *Platystomina*, both are wanting. The *Ortalina* are also distinguished from the two above-named groups by a smaller oral opening, a less developed clypeus, a less stout proboscis, a less turgid mentum and smaller palpi. In several genera, moreover, the thoracic dorsum is beset with bristles as far as its anterior portion. The abdomen of the female has five segments, which brings this group nearer to the *Cephalina* than to the *Platystomina*.

The geographical distribution of the *Ortalina* is, as far as known, confined exclusively to America and to Europe, with those parts of Asia which belong to the faunal province of the latter. Very striking is the great agreement between the European and North American forms of this group. As the knowledge of the latter is still very fragmentary, the generic distribution of the probably numerous species which may be discovered yet would offer great difficulties, or lead into error, unless based upon the knowledge of the European genera. I will give here, for this reason, a review of all the European genera adopted at present. Besides these, however, to the *Ortalina* must be reckoned the genus *APOSPASMICA*, which I propose to establish for the South American *Ortalis fasciata* Wied. and the genus *AUTOMOLA*, which I have adopted above for *Ortalis trifasciata* Wied. and *atomaria* Wied.

The European genera of *Ortalina* are the following:—

## 1. DORYCERA Meig.

*Charact.*—Eyes round; cheeks very broad; face very much projecting in profile; inferiorly it is very strongly retreating, carinate.

The hairs on the body have the ordinary length, or a little over the ordinary; thoracic dorsum bristly on its hind portion only.

Antennæ projecting, either of ordinary breadth and medium length, with the third joint oval; or narrow and elongate, with an elongate third joint.

The first longitudinal vein bristly at its end only.

This genus contains gray species, their faces with dark spots, and with well-marked black stripes upon the thorax; the wings are either without any picture, or it consists of blackish-gray longitudinal lines, which are more confluent towards the apex, and even, in the male of one species, form a large, black spot.

The genus may be divided into two sections, which it will be necessary, when the number of species grows larger, to separate as genera.

Sect. 1. (*Dorycera*, sensu strict.) Antennæ narrow and very much prolonged; the pilosity of the body is of an ordinary length.

Typical species: *graminum* Fab.

Sect. 2. (*Percnomatia* Lw.) Antennæ of ordinary breadth and of medium length; pilosity of the body longer than usual.

Typical species: *inornata* Lw.

## 2. TETANOPS Fall.

*Charact.*—Eyes rounded-ovate; cheeks broad. Face in the profile very much projecting, more or less retreating inferiorly.

The hairs upon the whole body extremely short; the middle of the thoracic dorsum bristly on its hind part only; the prothoracic bristles are smaller than in all the other genera of *Ortalina*.

Antennæ short, often strikingly short; their third joint oval; somewhat longer than the second.

The first longitudinal vein is bristly at its end only.

This genus contains remarkably glabrous species; there are no thoracic stripes; the first segment of the ovipositor is comparatively large; there is no picture on the wings at all, or it consists only in narrow borders along the crossveins, or in more or less faded spots at the end of the longitudinal veins, thus resembling the picture of *Ceroxys*.

Typical species: *myopina* Fall.

## 3. CORMOCARIS LW.

*Charact.*—Eyes round; cheeks very broad; face in the profile strongly projecting, very much retreating inferiorly, not carinate.

Hairs on the body comparatively long; thoracic dorsum hairy and bristly as far as its anterior portion.

Antennæ short; the rounded oval third joint hardly as long as the second.

First longitudinal vein bristly at its end only.

Gray species, the abdomen and thorax of which are without any picture, and the wings dusky and somewhat spotted along the anterior margin.

Typical species: *bucephala* Meig.

## 4. PTEROPECILA LW.

*Charact.*—Eyes small, rounded oval; cheeks broad; front very much projecting.

Hairs on the body of the usual length; the middle of the thorax bristly on its hind portion only.

The rounded third joint of the antennæ short; the second likewise short.

The first longitudinal vein is hairy upon its whole length.

The coloring of the body is gray; the picture of the wings is not unlike that of *Idana marginata* Say.

Typical species: *lamed* Schrk.

## 5. PTILONOTA LW.

*Charact.*—Eyes elongated oval; front but little projecting.

Thorax bristly upon its middle, as far as its anterior portion.

The third antennal joint rounded oval; the second shorter.

The first longitudinal vein bristly at its end only.

Cinereous-gray species, the thorax of which is marked with four somewhat darker longitudinal lines; the picture of the wings consists of large blackish spots; in several species these spots are so much confluent that the picture of the wings can almost be called guttate.

Typical species: *centralis* Fab.

## 6. ORTALIS FALL.

*Charact.*—Eyes rather large, elongate oval; front only moderately projecting.

Hairs on the body of the usual length; the middle of the thoracic dorsum bristly on its hind portion only.

The rounded third antennal joint short, the second of the same length with it.

Both crossveins not more approximate than usual; the first longitudinal vein bristly at its end only.

The genus *Ortalis* contains species above the average size, some of them rather large; the abdomen is banded with gray; the thorax strongly pollinose, in most species with conspicuous black, in some, with gray longitudinal stripes, in a few, without any stripes. The wings are more or less spotted.

Typical species: *ruficeps* Fab.

#### 7. SYSTATA LW.

*Charact.*—Eyes rather large, elongate oval; front only little projecting.

The hairs on the body as usual; the middle of the thoracic dorsum with bristles upon its hind portion only.

The rounded third antennal joint is short; the second of equal length with it.

The two crossveins are very closely approximated; the first longitudinal vein bristly at its end only.

The species of this genus differ from those of *Ortalis* in the very close proximity of the crossveins, but agree with them in the remainder of the organization. The picture of the wings consists in bands.

Typical species: *rivularis* Fab.

#### 8. LOXODESMA LW.

*Charact.*—Eyes large, elongate; front but little projecting; face rather strongly carinate; cheeks narrower than in most other genera.

Hairs on the body as usual; thoracic dorsum with bristles upon its hind part only.

Third joint of the antennæ more or less prolonged, rounded at the tip; the second much shorter.

Both crossveins very much approximated; the first longitudinal vein bristly at its end only.

The species belonging here remind of the *Systatæ* in the striking proximity of the crossveins, differ however in other respects very much from them, and that in the same way as the species of *Pteropæctria* differ from *Ortalis*. The relation of *Loxodesma* to *Pteropæctria*, which is by far the most closely allied genus to

It, is exactly the same as that of *Systata* to *Ortalis*. The coloring and the picture of the wings resemble those of the first section of *Pteropæctria*, only the obscure borders of the crossveins coalesce more or less, on account of their proximity, into a single cross-band.

Typical species: *lacustris* Meig.

#### 9. PTEROPÆCTRIA Lw.

*Charact.*—Eyes large, elongate; front but very little projecting, face rather strongly carinate; cheeks narrower than in most other genera.

Hairs on the body of the usual length; the middle of the thoracic dorsum bristly on its posterior portion only.

Third antennal joint more or less elongate, rounded at the end; the second very much shorter.

The crossveins are at the usual distance from each other; the first longitudinal vein has bristles upon its end only.

This genus contains small, shining black species, the thorax of which shows only a faint trace of pollen. The picture of the wings generally consists in the dark color of the costal and sub-costal cells, a more or less distinct black border of the crossveins and a black spot on the costa, lying a little before the apex, or upon it; in some species, however, this picture expands into four crossbands which are connected, two and two, near the costa.

The genus is divided into two sections, which may even be considered as separate genera. They are easily distinguished by the picture of the wings, which is in keeping with a corresponding difference in the rest of the organization.

Sect. 1. (*Pteropæctria*, sensu strict.) with spotted, or incompletely banded, wings.

Typical species: *palustris* Meig.

Sect. 2. (*Thryophila* Lw.); bands on the wings complete.

Typical species: *frondescentiae* Lin.

#### 10. TEPHRONOTA Lw.

*Charact.*—Third antennal joint, although not excised on the upper side, still with a sharp anterior corner.

Thoracic dorsum, upon its middle, not bristly in front of the region of the suture.

First longitudinal vein bristly upon its end only; the fourth not bent forward; the posterior angle of the anal cell not prolonged in a lobe.



*Tephronota* begins the series of those genera, the third antennal joint of which is not rounded at the tip, but ends above in a sharp corner. It contains small species which, in the shape of their body, and especially in the structure of the head, remind of the *Pteropæctriæ* very much. But they can always be distinguished by their thorax, which is thickly covered with a gray pollen, even should the third antennal joint, in drying, have lost the sharpness of its upper corner. The picture of the wings consists either of complete crossbands, or of spots and half-bands, or even of spots only.

Typical species: *gyrans* Lw.

#### 11. CEROXYS Macq.

*Charact.*—Third antennal joint distinctly excised on its upper side.

Thorax upon its middle beset with bristles as far as its anterior portion.

First longitudinal vein bristly upon its end only; fourth longitudinal vein not bent forward; the posterior angle of the anal cell not drawn out in a lobe.

Yellowish-gray or cinereous-gray species, with a thorax without stripes, and with wings having large dark spots; the arista is always distinctly pubescent.

Typical species: *crassipennis* Fab.

#### 12. HYPOCHRA Lw.

*Charact.*—Third antennal joint distinctly excised on its upper side.

Thorax, upon its middle, not bristly in front of the region of the suture.

First longitudinal vein with bristles upon its end only; fourth longitudinal vein not bent forward; posterior angle of the anal cell not drawn out in a lobe.

Small, grayish-white species, with a very limited picture of the wings, generally consisting of a very narrow border of the crossveins.

Typical species: *albipennis* Lw.

#### 13. ANACAMPTA Lw.

*Charact.*—Third antennal joint distinctly excised upon its upper side.

Thorax, upon its middle, not bristly in front of the region of the suture.

First longitudinal vein bristly upon its end only; fourth longitudinal vein bent forward towards its end; posterior angle of the anal cell not drawn out in a lobe.

Rather robust species having the thorax pollinose with gray, without stripes or with weak ones, a black, shining abdomen, generally with gray bands, and wings which have black crossbands, or spots almost forming such crossbands.

Typical species: *urticæ* Lin.

#### 14. HOLODASIA Lw.

*Charact.*—Third antennal joint distinctly excised on its upper side.

Thorax without bristles upon its middle, in front of the region of the suture.

First longitudinal vein bristly upon its whole length; fourth longitudinal vein curved forward at the end; posterior angle of the anal cell not drawn out in a point.

*Holodasia* differs from *Anacampta* (which it otherwise resembles very much) in the fact that the first longitudinal vein is bristly upon its whole extent, and not upon its end only. In this it agrees with *Pteropæcila*, from which it differs in the not projecting front, longer antennæ, the third joint of which is excised upon its upper side and pointed at the tip and in the fourth longitudinal vein being curved forward.

Typical species: *fraudulosa* Lw.

#### *Fifth Section: Pterocallina.*

At the beginning of the chapter on the Systematic Distribution of the Ortalidæ, I have pointed out *Scatophaga fasciata* as the species of this group known for the longest time and which may be considered as typical. It was described under that name by Fabricius in the *Systema Antliatorum*, was transferred by Meigen to the genus *Trypeta* and by Robineau Desvoidy to his new genus MYENNIS. It is very probably the same fly which was described by Coquebert in his *Iconographia*, Dec. III, under the name of *Musca octopunctata*, although it has nothing of the picture of the thorax shown in Coquebert's figure and which gave rise to the specific name. Although the publication of Coquebert's name is probably a little anterior to that of Fabricius, the choice of this name, based upon a non-existing character, as well as the nature of the entomological correspondence, which existed

between both authors, forbid us from giving Coquebert's name the priority over Fabricius's.

At the same place I have also observed how very distinct a species *Myennis fasciata* is, with its *Trypeta*-like stature, its low head and especially the very large distance between the ends of the auxiliary and of the first longitudinal vein; the latter character especially is quite peculiar among the *Ortalidæ* with a bristly first longitudinal vein.

Among the *Ortalidæ* hitherto described, the following species, as far as known to me, show a sufficient agreement, in their characters, with *Myennis fasciata* to be considered as belonging to the same circle of relationship: *Trypeta ocellata* Wied., from the environs of Bahia, Brazil; *Ortalis obscura* Wied., from Brazil, *Ortalis vau* Say, and *Platystoma annulipes* Macq., the two last from the United States. The numerous characters which all these species share with *Myennis fasciata*, besides the already mentioned peculiarities belonging to this species in particular, are: 1, the unmetallic coloring of the body; 2, the comparatively low, but rather broad head; 3, the broad front; 4, the rounded, more or less protruding eyes; 5, the round, or very short rounded-oval shape of the third antennal joint; 6, the shortness of the more or less concave face; 7, the small development of the clypeus; 8, the comparatively large development of the chest; 9, the prothoracic bristle, represented by a very small hair only; 10, the middle of the thorax, which is beset with bristles upon its hind part only; 11, the convex scutellum, provided with four bristles; 12, the very much abbreviated fifth segment of the female abdomen, which is very often quite withdrawn under the preceding segment; 13, the posterior angle of the anal cell, which is drawn out in a point, or even in a lobe.

Although the agreement in so many characters affords a distinct proof of the close relationship of these species, each of them shows at the same time plastic differences of such an importance, that one might be tempted to establish a separate genus for almost every one of them. These differences principally consist in the different shape of the wings, and in the different course of their veins, while the rest of the organization shows a remarkable agreement.

In the shape of the wings two remarkable modifications are worthy of notice, and may serve at some future time for a further subdivision of this group.

The wings of *Trypeta ocellata* and *obscura* differ from the usual shape of the wings of the *Ortalidæ* by their narrowness, the parallelism of their anterior and posterior margins, their broad and rounded apex and their comparatively great length. Macquart placed the first of these species in the genus *Platystoma*, and the second, still more oddly, in the genus *Camptoneura*. Rondani has had a better eye for the plastic peculiarities of *Trypeta ocellata* and established the genus *PTEROCALLA* for it. I have derived the name of the present group from this well-founded genus of Rondani's, and not after Rob. Desvoidy's *Myennis*, established for *Scatophaga fasciata*, because the latter name, although much earlier in date, is a senseless malformation.

*Trypeta obscura* is, as Wiedemann has correctly observed in its description, a near relative of *Pterocalla ocellata*. As what occupies us now is the systematic location of only a small number of species, we can, without any hesitation, unite both of these species in the same genus, although the venation of *T. obscura* differs from that of *Pterocalla ocellata* in the second longitudinal vein being more arcuate than undulated, and in the fourth longitudinal vein being distinctly curved forward.

A small North American species, which will be described below, stands close enough to those two species in the shape of its wings and its venation to be placed in the same genus. It differs however in the second, third, and fourth longitudinal veins being quite straight, and neither wavy nor arcuate.

A most striking resemblance to this *Pterocalla strigula* is exhibited by *Trypeta ulula*, a South African species, described by me (*Berl. Entom. Zeitschr.*) after an incomplete specimen, without head. Already in describing this species, I drew attention to the fact that it differs from the ordinary venation of the *Trypetina* in the great distance intervening between the tips of the auxiliary and of the first longitudinal veins. I do not doubt now that this species is a *Pterocalla*, and that I would have recognized this earlier if I had had a complete specimen before me. Both species agree very well in all their plastic characters, especially in the shape of the wings and in the venation; the only difference which I notice in *P. ulula* is the position of the posterior crossvein, which is much steeper.

The genus *Pterocalla*, as I define it here, thus embraces all those *Pterocallina* which, in the outline of their wings, resemble

*Pterocalla ocellata*, so that this outline must be considered as the principal diagnostic character of this genus.

Among the numerous undescribed *Pterocallina*, which I have seen, I know of no one which may be placed in the genus *Pterocalla*, although several of them agree with the species of this genus in some one point pertaining to the venation. But none of those species has the wings of that peculiar shape which characterizes *Pterocalla*; on the contrary, the outline of the wings of all these species does not, in any marked degree, differ from that of the ordinary *Ortalidæ*. Like the species enumerated above, they have this peculiarity, that each species, although agreeing with the others in the characters belonging to the group, at the same time shows such important plastic differences, that the establishment of a series of new genera becomes indispensable. I regret not to be able to enter here into the detail of this subject, as, without plates, it is impossible to define those genera sufficiently. Thus much only will I mention, that among them there is a species which has the posterior angle of the anal cell rounded. The generic distribution of the North American species, which will be described below, does not, fortunately, require these South American forms to be taken into consideration.

Among the North American *Pterocallina*, *Ortalis vau* Say is the nearest to *Myennis fasciata* Fab. The venation, however, is different enough to prevent us from placing them in the same genus. The two crossveins in *O. vau* are less approximated, and the anterior end of the posterior one is further from the basis of the wing than the posterior end, while in *Myennis fasciata* the contrary is the case, so that the posterior crossvein of this species has a different position. Moreover, the first segment of the ovipositor of the female of *Ortalis vau* has not the conically attenuated shape which it has in *Myennis fasciata* and in many *Trypetina*; it is broader, somewhat attenuated from its middle only, like the ovipositor of the majority of the *Ortalidæ*. I consider, therefore, *Ortalis vau* as the type of a new genus, which I call *STICTOCEPHALA*.

To *Stictocephala vau* must be added a second North American species, which I received from Baron Osten Sacken, under the name of *Tephritis corticalis* Fitch in litt., and which will be described by me under the same name. The venation resembles

that of *S. vau* so closely that I have no hesitation in placing it in the same genus.

There are two other North American species which I take to be undescribed, and which also belong to *Stictocephala*. As their wings are not pictured like those of the two preceding species, but simply banded, the difference between them seems, at first glance, to be greater than it really is. A close examination does not disclose any plastic difference which would justify their generic separation from *Stictocephala*. I will describe them as *Stictocephala cribrum* and *cribellum*.

The North American species described by Macquart as *Platystoma annulipes* shows, in the detail of its structure, an almost complete agreement with the species of *Stictocephala*, but differs so much in the outline of the wings and still more in the venation, that it cannot be placed in that genus. The difference in the outline of the wings consists in the fact that the posterior margin is more convex, and hence, the wings are broader; the difference in the venation appears in the posterior angle of the anal cell being drawn out in a very long lobe, and in the position of the posterior crossvein, the anterior end of which is much nearer to the apex of the wing than the posterior end. As this species does not find a convenient place in any of the existing genera, I am compelled to establish a new one for it, which I call **CALLOPISTRIA**.

This would close the series of the few genera of *Pterocallina*, hitherto sufficiently defined, if we had not to advert to the genus **PSAIROPTERA** Wahlb., occurring in northern and central Europe, as well as in northern Asia, a genus for which it is not easy to find an appropriate place in the system. The species of this genus resemble the *Ulidina* in their general appearance, and I would not have hesitated to place them in that section, if their third longitudinal vein was not distinctly beset with hairs. I acknowledge that their location among the *Ulidina* is more natural than among the *Pterocallina*. Nevertheless, I place the genus among the latter and thus put a greater stress upon the artificial character, derived from the pilosity of the third vein, than upon more close and natural affinities, but which are more difficult to explain in words. If I do this, it is because I hold that a strict adherence to those characters, by means of which I have tried to introduce into the systematic chaos of the

*Ortalidæ* a satisfactory distribution in groups, is more apt to insure the recognition within these groups of available genera, than if we should attempt to avail ourselves of affinities, which, although visible to the eye, do not admit of exact definitions.

*Psairoptera* finds a fitting location at the end of the *Pterocallina*, so as to be immediately followed by the *Ulidina*. The principal differences from the above-mentioned genera of *Pterocallina* consist in the posterior angle of the anal cell, which is more or less a sharp right angle, and in the much smaller distance between the end of the auxiliary vein and that of the first longitudinal. The shape of the head likewise shows not unimportant differences from the other genera of the group, and some of the species of *Psairoptera* have, moreover, the last antennal joint of a more elliptical shape.

In enumerating the most characteristic distinctive marks of the *Pterocallina*, we cannot, for the above stated reasons, lay the same stress upon *Psairoptera* as upon the other genera of this group. These characters may be summed up as follows:—

*Habitus* *Trypeta*-like; coloring non-metallic; head rather broad, but low, with rather protuberant eyes; face short, perpendicular, excavated in the middle; clypeus but little developed; third antennal joint round or rounded ovate; thoracic dorsum bristly upon its posterior part only; third longitudinal vein hairy; and above all, as the most important character, the unusually large distance between the end of the first longitudinal and that of the auxiliary veins.

For the *Pterocallina* from North America, hitherto known, we can add to the above-enumerated characters the posterior angle of the anal cell, which is drawn out in a long lobe.

## SECOND DIVISION.

### ORTALIDÆ HAVING THE FIRST LONGITUDINAL VEIN BARE.

The European genera belonging here are: *SEOPTERA* Kirby, *TIMIA* Wied., *ULIDIA* Meig., *CHRYSOMYZA* Fall., with which *Chloria* Schin. is coincident, and *EMPYELOCEBA* Lw. They are allied enough to each other to be united in the same group.

A type, very different from the preceding genera, appears in the genus *RICHARDIA* Rob. Desv., which seems to be rather

abundantly represented in America and likewise belongs to this division. A whole series of related genera, peculiar to America, may be classed with *Richardia*: like the latter, they are all distinguished by armed femora.

This is the reason why, in a former publication, I separated the whole second division of the *Ortalina* in two groups, the one with unarmed, the other with armed femora; the first I called *Ulidina*, the second *Richardina*; and in the *Berlin Entom. Zeitschrift*, Vol. XI, I described the American *Ulidina* which, at the time, were known to me. Now, however, that I have become acquainted with a larger number of forms belonging in this division, I incline to think that its separation in the groups • *Ulidina* and *Richardina* becomes more natural, if, as a distinguishing character of these groups, we assume, not the armed or unarmed femora, but the shape of the anal cell. All the genera having the posterior angle of the anal cell more or less pointed belong to the *Ulidina*; those genera, on the contrary, where this is not the case are to be placed with the *Richardina*. This modification does not much alter the distribution of the genera among these two groups, as all the genera with armed femora, at present known, will, in the new distribution, be likewise referred to the *Richardina*. Among the genera which, in the above-quoted publication, I placed with the *Ulidina*, *Epiplatea* alone will have to be transferred among the *Richardina*. Among the genera of *Richardina*, enumerated below, *Steneretma*, according to the former mode of subdivision, would have belonged to the *Ulidina*, and thus would not have been placed near *Idiotypa*, which is closely allied to it. With the former mode of distribution, the position of the new genus *Coniceps*, based upon a North American species, would have been a somewhat doubtful one, as the under side of its hind femora bears a few stronger hairs, but can hardly be called armed.

#### *First Section: Ulidina.*

The five genera of *Ulidina* represented in Europe, and enumerated in the preceding paragraph, are not confined to this part of the world. The European *SEOPTERA vibrans* also occurs in the adjoining provinces of Asia, and is represented in America by a species most closely resembling it. European species of



TIMIA, EMPYLOCERA, and ULIDIA occur in Asia together with other species, peculiar to that part of the world. CHRYSOMYZA *demandata* likewise ranges over a considerable part of Asia and Africa; both countries contain besides species of this genus peculiar to them.

The South American *Ulidia stigma* Wiedemann and the Brazilian *Ulidia bipunctata* Macq. are not *Ulidia* at all, although they probably belong to the group *Ulidina*, the first to the genus *Notogramma*, the last to *Euxesta*. *Ulidia metallica* Bigot, from Cuba, is perhaps a *Chrysomyza*; as to the *Ulidia fulvifrons* Bigot, from the same locality, it is impossible, from Bigot's description, to come to any conclusions about its place in the system.

America seems in general to be very rich in forms belonging to the *Ulidina*. For the species which came within my knowledge I have established the genera: DASYMETOPA, OEDOPA, NOTOGRAMMA, EUPHARA, ACROSTICTA, EUXESTA, CHÆTOPSIS, HYPOECTA and STENOMYIA.

The species described by former authors, which belong in the circle of the above-mentioned genera, are to be found in Wiedemann partly in the genus *Ortalis*, partly in *Ulidia*. In Macquart, as far as I can ascertain, they are scattered among the *Ulidia* or even in *Ceroxys* and *Urophora*, which shows, on that author's part, an utter neglect of their plastic characters. The genus EUMETOPIA established by Macquart in his family *Psilomydæ*, does not belong to it, but to the *Ulidina*.

It is not doubtful at all that Asia and Africa, besides the genera which they have in common with Europe, harbor some genera of *Ulidina* which are peculiar to them. GORGOPIS Gerstæcker, described by Doleschall, some time previously, under the inappropriate name of *Zygænula*, probably belongs to this group. It differs, it is true, from all the known *Ulidina* very much; still the structure of the head in *Oedopa* may be indicative of an affinity.

Unfortunately I cannot give any further information concerning other exotic *Ulidina* of the old world, as I have none in my possession. The existing descriptions of a number of *Ortaliidæ* which may possibly belong to the group *Ulidina*, are not accurate enough to admit of any positive conclusions.

I have not met with any *Ulidina* from Oceanica yet.

*Second Section: Richardina.*

Among all the genera of this group, *RICHARDIA* Rob. Desv., distinguished by its posterior femora, armed with spines, is the best and longest known. This circumstance induced me to derive the name of the section from it. It seems to be exclusively American; the *Richardia flavitarsis* Macq., from the Marquesas Islands, does not belong to this genus, and if the manner in which the auxiliary vein is represented upon Macquart's figure be only of average correctness, we may even infer that it does not belong to the *Richardina* at all. The other species which Macquart, Rondani and Gerstæcker have added to the genus *Richardia* are all natives of America. The two males of *Richardia* described by Gerstæcker are distinguished by the dilatation of their head, somewhat in the manner of *Achias*; their females are not known yet; still the analogy of *Achias* and of other genera, having a similar structure of the head, justifies us in supposing that their heads do not show any extraordinary dilatation.

The fly of unknown *habitat* which Macquart described as *ODONTOMERA ferruginea* undoubtedly belongs in the immediate affinity of *Richardia*. As I have never seen it, my knowledge of it is based exclusively upon Mr. Macquart's statements. These, however, are entirely sufficient to prove that the fly belongs in the family *Ortalidæ*, and not in the *Trypetidæ*, where Macquart places it. That it belongs to the *Richardina* I infer from the evidently very close relationship which exists between it and the *Sepsis Guérinii* Bigot from Cuba. The generic name must be changed, on account of the already existing *Odontomerus* Gravenh.

This *Sepsis Guérinii* agrees in so many characters with *Odontomera ferruginea* Macq. that one might be tempted to place it in the genus *Odontomera*. Should Macquart's statements, however, be correct, this would not be admissible, as *Odontomera ferruginea* possesses not only much stouter femora and a much more projecting front, but also an auxiliary vein which is much less approximated to the first longitudinal than in *Sepsis Guérinii*. We are compelled, therefore, to consider *Sepsis Guérinii* as a separate genus of the *Richardina*, which we will call *STENOMACRA*.

We have, in the next place, to mention the genus *SETELLIA*.

It was founded by Rob. Desvoidy, and *Setellia atra* Rob. Desv. must be considered as its type. I have not seen this species, and, unfortunately, the statements of Rob. Desvoidy are not sufficient to enable me to decide whether *Setellia atra* belongs to the *Richardina* or to the *Cephalina*. In the same way, I am unable to decide whether the Brazilian species, subsequently described by Macquart as *Setellia apicalis* really belongs in the same genus with *Setellia atra*. As Rob. Desvoidy does not allude at all to the femora of his species being spinous, while Macquart's species is remarkable for all its femora being armed in a rather striking manner, it becomes exceedingly doubtful whether Macquart's species is a *Setellia* in the sense of Rob. Desvoidy's.

I do not know of any species more related to *Setellia apicalis* Macq. than that species from Colombia, South America, which Gerstæcker described under the name of *Michogaster egregius*. As its first longitudinal vein is bare and its femora are armed, it cannot possibly remain connected with the true species of *Mischogaster*, but must be considered as the type of a separate genus of *Richardina*, for which I propose the name of *EUOLENA*.

To place *Setellia apicalis* in the genus *Euolena* is not possible; it has no stump of a vein upon the second longitudinal vein inside of the submarginal cell, a character distinguishing *Euolena egregia*; its third and fourth longitudinal veins converge more distinctly towards their end, and the posterior angle of the anal cell is not rounded. *Setellia apicalis* will also have to be considered as the type of a separate genus, which may be called *SYNTACES*. In the supposition that the first longitudinal vein of *Syntaces apicalis*, like that of its relative *Euolena egregia*, is bare, I think that the best location for this genus is among the *Richardina*. It is true that the posterior angle of the anal cell, in Macquart's figure, is almost acute; in the generic diagnosis, however, he calls the anal cell: "terminée carrément," so that the shape of this cell cannot be an obstacle to the location of the genus among the *Richardina*; and this view is supported by the spinous femora, a character common to nearly all the genera of this group. Should, however, the first longitudinal vein of *Syntaces* be hairy or bristly, then the location of the genus among the *Richardina* would be impossible.

Next to *Euolena* is the genus *IDIOTYPA*, which I establish for a new species from Cuba. In its general habitus it is almost

like one of the more corpulent American species of *Baccha*; for instance, *Baccha capitata* Lw. The second longitudinal vein, which in *Euolena* forms a short stump inside of the submarginal cell, bears, in this genus, almost at the same place, similar stumps, not only in the submarginal, but also in the marginal cell. The most striking difference, however, lies in the structure of the feet, as *Euolena* has the four posterior femora remarkably long and slender, which is not in the least the case with *Idiotypa*.

The genus *STENERETMA*, which will be characterized in the third part, treating of the North American species, is related to *Idiotypa*.

The South American species described by Fabricius once as *Scatophaga trimaculata* and another time as *Dacus flavus*, and which Wiedemann placed in the genus *Trypeta*, does not belong in this genus at all, but in the present group of the *Ortalidæ*. The description, which Macquart gave of his *CÆLOMETOPIA ferruginea*, contains so much which is entirely applicable to Fabricius's species, that I have no doubt that the latter species was the very same from which the description of *Cœlometopia ferruginea* was drawn. When Macquart says that in *C. ferruginea* the middle femora alone are armed, this statement is probably based upon an insufficient observation; when he calls the last three tarsal joints white, this seems to be a *lapsus calami*, as the figure shows nothing of the kind, and as on two of the tarsi the first joints are even represented as much paler than the following ones; the latter probably being infuscated, as they are in Fabricius's species. Should even, contrary to my supposition, Macquart's species be different from that of Fabricius, they will at all events belong to the same genus.

The *Odontomera maculipennis* of Macquart from Colombia, South America, seems very closely allied to *Cœlometopia*; Macquart's own statements show that it agrees in so many characters with *Cœlometopia trimaculata*, that it may be transferred to the same genus with it; one would even be led to suppose that it is nothing but the female of *Cœlometopia trimaculata*. With the above mentioned *Odontomera ferruginea* Macq. (not *Cœlometopia ferruginea* Macq.) *Odontomera maculipennis* has too little in common to be considered as belonging to the same genus.

A pretty species from Cuba, which will be described in the

sequel, can also be placed in the genus *Cœlometopia*, although the ocelli, which here, as well as in the latter genus, are rather much forward on the front and close to each other, are placed here upon a very gentle elevation, while in *Cœlometopia* the projection which bears them is quite high.

Closely related to *Cœlometopia* is the species described by Wiedemann as *Trypeta cyanogaster*. It is not a real *Cœlometopia*, as its posterior ocelli are less remote from the vertex and the anterior one quite distant from them; moreover the third and fourth longitudinal veins are parallel here and the hind femora alone bear a few bristles, while in *Cœlometopia* all the femora are beset with spines. For this reason *Trypeta cyanogaster* has to be considered as the type of a new genus, which may be called **MELANOLOMA**. A second species of this genus, from Brazil, has the same picture of the wings as *M. cyanogaster*, consisting in a black border of the costal margin and of the small crossvein.

Other Brazilian *Ortalidæ* resemble the genus *Melanoloma* in the fact that the third and fourth longitudinal veins are parallel; the agreement in the structure of the rest of the body, especially of the head, is very striking. These species differ, however, in all the femora being spinous, in the arista being distinctly pubescent, in the still greater distance between the anterior ocellus and the two posterior ones, in the close proximity of the two crossveins of the wings, and in the picture of the wings, which does not consist in a black border on the costa, but in large, crossband-like spots. I deem it useful to introduce for such species a new genus, which I will call **HEMIXANTHA**; a species of this genus, *H. spinipes*, will be described below.

That *Dacus flavicornis* Wied., from Brazil, belongs in the same circle of relationship is proved by the original specimen, preserved in the Berlin Museum.

Before having subjected that specimen to a second and more close examination, I would not venture to decide whether it can be placed in any of the genera, which I have just discussed. As far as I remember, its scutellum bears only two bristles; this would prevent its identification with any one of those genera, as it is very unlike just those among them which share that character with it. Otherwise it has the same *Dacus*-like structure of the face as most *Richardina*; the third antennal joint is elongated;

the slender arista is distinctly pubescent; the abdomen is of an equal breadth; the posterior angle of the anal cell is not acute and the fourth longitudinal vein somewhat convergent with the third; all the femora are armed.

I have also to mention the genus *CONICEPS*, which I find necessary to establish for a North American species. On account of the retracted posterior angle of the anal cell it must likewise be placed among the *Richardina*, although in its general appearance it is more like certain *Ulidina*, especially *Eumetopia*.

The reason why I place *EPIPLATEA* among the *Richardina* has been alluded to above.

Thus I have reached the limit of the genera, the location of which among the *Richardina* appears to me beyond doubt. It is certain that the number of *Richardina* which may yet remain unrecognized among the existing descriptions is far from exhausted by me; but who would venture, upon the statements of most of these descriptions, to form an opinion on the systematic location of the species which they mean to represent!

It will hardly be necessary to mention here the East Indian genus *MERACANTHA*. Its spinose femora may suggest the supposition that it belongs to the *Richardina*. But as this character does not belong exclusively to this group, and as the very acute angle of the anal cell of *Meracantha* does not occur among the *Richardina* in the acceptance of that group as I understand it here, I cannot consider *Meracantha* as belonging to the *Richardina*.

Besides the bareness of the first longitudinal vein and the not acute posterior angle of the anal cell, which two characters constitute the diagnosis of the *Richardina*, the following characters are common to all the genera which I have had occasion to examine in detail: a break in the costal vein immediately before the end of the auxiliary vein; the great proximity between the auxiliary and first longitudinal veins and the very small distance between their ends; finally the thoracic dorsum being beset with bristles upon its posterior part only.

### III.

#### THE NORTH AMERICAN ORTALIDÆ.

It is a long time since I intended to publish a monograph of the North American Ortalidæ. The hope and expectation, however, of increasing in a measure my very fragmentary knowledge of this family by the addition of more species, either new or not yet seen by me, induced me to postpone for some time the completion of my work. Unfortunately, this expectation has not been fulfilled. Within the last four years, only five species were added to those previously known by me, and it became evident that if I had to wait for a tolerable increase of my acquaintance with the Ortalidæ, my work would run the risk of remaining unpublished. I let it appear, therefore, in the best shape I could give it, with the scanty materials at my command. I have no doubt that North America contains a far larger number of genera than those which came within my knowledge. In order to define, with some approximation, the systematic position of the genera of which I have not had any representatives for comparison, I have included in this monograph all the South American genera of which I possess specimens; inasmuch as it is very probable that most of them occur at least in the southern portion of North America. The striking analogy between the North American and European *Ortalina* renders it very probable that the number of genera in this group, common to both continents, is larger than it appears at present. For this reason I have deemed it useful to include in the general characters of the *Ortalina* all the data necessary for the recognition of the more difficult and less well known among the European genera.

#### *Synopsis of the Distribution of the Family.*

DIVISION I.—First longitudinal vein bristly or distinctly hairy.

A. Ovipositor not flattened.

Section I. *Pyrgotina*.

## B. Ovipositor flattened.

## a. Third antennal joint not circular.

## 1. No prothoracic, no mesothoracic bristle.

Section II. *Platystomina*.

## 2. No prothoracic, but a mesothoracic bristle.

Section III. *Cephalina*.

## 3. A prothoracic and a mesothoracic bristle.

Section IV. *Ortalina*.

## b. Third antennal joint circular.

Section V. *Pterocallina*.

## DIVISION II.—First longitudinal vein bare.

A. Posterior angle of the anal<sup>1</sup> cell drawn out in a point, or, at least, more or less acute.

Femora never armed.

Section I. *Ulidina*.

## B. Posterior angle of the anal cell obtuse, rounded or retracted.

Femora armed in most of the genera.

Section II. *Richardina*.

## FIRST DIVISION.

## ORTALIDÆ WITH THE FIRST LONGITUDINAL VEIN BRISTLY OR DISTINCTLY HAIRY.

*First Section: PYRGOTINA.*GEN. I. **PYRGOTA** WIED.*Charact.*—*Front* of equal breadth, without ocelli, very much projecting in profile.*Antennæ* drooping, second joint rather long, third more or less ovate; arista pubescent.*Face* retreating, under the antennæ with deep foveæ, separated by a very low ridge; they reach as far as the middle of the face, or only a little below; lateral parts of the face very broad, still more approximated on the lower half of the face; *oral opening* comparatively small; *clypeus* but little developed; *proboscis* not stout.*Scutellum* with many bristles.

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<sup>1</sup> It may not be useless to refer here to Vol. I, p. xxiv, of these *Monographs*, where (fig. 1) a wing of *Ortalis* is represented. The anal cell is marked M on the figure, and is the same as the third basal cell, or the posterior one of the small basal cells. Although this synonymy is not mentioned in the explanation of the figure (at the foot of the same page), it may be found in the same volume, p. xx, line 18 from the top.—O. S.



*Abdomen*: in the male with four segments, the first of which strikingly prolonged, the following ones considerably shorter; in the female with five segments, the first of which very remarkably prolonged, the following ones quite as remarkably shortened; *ovipositor* large, not flattened, almost capsule-shaped.

*Spurs of the middle tibiæ* only bristle like; very weak in the species with less coarse hairs.

*Wings* large; posterior angle of the anal cell acute; small crossvein beyond the middle of the long discal cell; third longitudinal vein curved backwards towards its end; the last section of the fourth longitudinal vein arcuated, but little diverging from the third.

Macquart's genus *Oxycephala* is identical with *Pyrgota*. Harris, in his Catalogue of the Insects of Massachusetts, calls this genus *Sphecomyia*.

Real *Pyrgotæ* are known to occur with certainty in North America only. As in Europe and Africa genera occur, which are closely allied to *Pyrgota*, it is not impossible that Walker's *P. latipennis* (List of Dipt. p. 1087) from Sierra Leone is a real *Pyrgota*; however, his description is altogether silent concerning those characters which are indispensable for the recognition of the genus. Whether *P. pictipennis* Walker (List, etc. 1162) belongs to this genus is very doubtful; the author himself introduces it with a doubt, but remains silent as to the motives of this location as well as the cause of the doubt.

The North American *Pyrgotæ* at present known may be divided in two groups: in the first, the arista is only two-jointed, and, at the same time, the usual bristles on the vertex, as well as those bristles which in other genera protect the ocelli, are present; in the other group, the arista is distinctly three-jointed, and there are no conspicuous bristles either on the vertex, or round the spot where, in other genera, the ocelli are placed. *Pyrgota millepunctata* belongs to the first, all the other species to the last group. Were the number of the species larger, these characters would justify a subdivision in two genera; at present, with the small number of species, all easy to identify, this subdivision would be useless.

**1. *P. millepunctata* Lw.** ♀.—Fusco picea, seta antennali biarticulata; alæ infuscatæ, guttulis numerosis subpellucidis aspersæ.

Pitch-brown; arista two-jointed; wings infuscated, dotted with numerous pellucid spots. Long. corp. 0.38—0.43, cum terebra 0.51—0.55, long. al. 0.49—0.55.

SYN. *Pyrgota millepunctata* LOEW, Neue Beitr. II, 22, 50.

? *Oxycephala maculipennis* MACQ. Dipt. Exot. Suppl. I, p. 210. Tab. xxviii, f. 2.

*Sphecomyia valida* HARRIS, Catal. Ins. Mass.

Prevailing color of the body pitch-brown, reddish-brown or even brownish-red in less intensely colored specimens, with a black pubescence, which is perceptibly coarser than in the following species. The occiput has, behind the vertex, a distinct black triangle, with its point directed downwards, which is connected with a black spot on the place where the ocelli should be; at some distance from this triangle there is, on each side, a large black spot, reaching from the posterior orbit of the eye almost to the point of attachment of the head; between these spots and the triangle the color is clay-yellow, almost wax-yellow; the sides of the occiput are generally of a similar yellow color, but become more infuscated towards the orbits and the cheeks, or are tinged with brownish as far as the black spots above. The front has a broad black stripe, which is divided longitudinally in two by a more or less complete and more or less narrow, sometimes more yellow, sometimes brownish, line; on both sides, near the orbits, the stripe is margined with yellow. The ordinary strong bristles on the vertex, the bristle placed in front of these, on each side, near the orbit, and those bristles which are inserted in the region of the ocelli (which here are wanting), are all present. The first antennal joint is generally rather dark-brown, except at the basis; the second is usually of a dirty brownish-yellow; the third agrees in its coloring sometimes with the first, sometimes more with the second joint; in some specimens, it is altogether ochre-yellow; the arista is distinctly two-jointed, the first joint short. The face is usually of a dark ferruginous-brownish coloring, often verging on ochre-yellow on the sides. The antennal foveæ are somewhat less deep than in *P. undata*, but perceptibly longer and separated by a higher ridge. The sides of the face are approximated on the lower half, but not so much by far as in *P. undata*, so that the middle part of the face has about double the breadth of the other species. The oral opening is more horizontal than in *P. undata*. The but little developed clypeus is black, the palpi generally yellow; their shape is almost the same as in *P. undata*. The ground color of the thorax is clay-yellow or wax-yellow, but with very broad pitch-brown stripes,

which occupy everything but the humeri and the narrow intervals between the stripes, so that the prevailing color is the brown one; the middle stripe, which is of equal breadth, is longitudinally divided in two by a lighter longitudinal line; the stripe stops at the last quarter of the thorax, however, beyond it, at the posterior margin of the thorax, there is a brown spot; the very broad lateral stripes are strongly abbreviated anteriorly, attenuated and interrupted at the transverse suture; moreover, the lateral margin has a broad brown border. Scutellum blackish-brown, paler on the sides; the numerous bristles are more conspicuous in this species on account of their stoutness and their black coloring. Pleuræ pitch-brown, clay-yellowish on the sutures. Abdomen usually blackish-brown or dark pitch-brown, sometimes ferruginous-brown or yellowish-brown; the first segment is about once and a half the length of the four following segments taken together. The capsule-shaped ovipositor is of the same color as the abdomen, or somewhat paler; its shape is nearly the same as in *P. undata*, but it is a little less pointed; on each side, not far from the basis, it has a large, impressed spot. The color of the feet is as variable as that of the remainder of the body; blackish-brown in more intensely colored specimens, otherwise ferruginous-brownish; the knees are always clay-yellow; paler colored specimens have the extreme tip of the tibiæ and the tarsi of a dirty ferruginous-yellow or ochre-yellow color. The shape of the wings is not unlike that in *P. undata*, but towards the apex they are broader. The chief differences in the venation are the following: the little stump of a vein on the second longitudinal vein existing in *P. undata*, is wanting here; the discal cell is much broader, especially towards its tip; the posterior transverse vein is nearer the margin of the wing, much longer and more straight; the last section of the fourth longitudinal vein is less strongly arcuated and the second posterior cell much smaller; the posterior angle of the anal cell is more drawn out in a point. The whole surface of the wings has a rather uniform dark-brownish coloring; this color is variegated by numerous transparent dots of a gray-yellowish tinge; the shape of these dots is rather irregular; they are often confluent, as often distinctly separated; round the root of the second longitudinal vein and round the small crossvein, the dark coloring is more continuous and less interrupted by dots; the brown

is also more intense along the costal margin, than upon the remaining surface.

*Hab.* Carolina (Zimmerman); Washington, D. C., New York, Illinois (Osten-Sacken); Massachusetts (Harris).

*Observation 1.*—Mr. Macquart (Dipt. Exot. Suppl. I, p. 210) describes as *Oxycephala maculipennis* from Texas (figured on Tab. XIX, f. 12), a species which either is a *Pyrgota* or is closely allied to this genus. In several respects this species shows a decided resemblance to *P. millepunctata*, and the question as to their diversity is a very doubtful one. The conformity is especially apparent in the picture of the wings and the venation, also in the coloring of the front and even in that of the thorax. But Macquart says that the thoracic stripes are interrupted near the suture (which is also rendered in his figure); moreover, according to the figure, the posterior angle of the anal cell is drawn out in a much longer point than is the case in *P. millepunctata*. These discrepancies alone, however, with Macquart's well-known inaccuracy in description and figure, would not be sufficient to neutralize the evident analogies. A more weighty ground for doubt is to be found in the representation of the abdomen; nothing like its remarkable breadth has been observed in any known *Pyrgota*; moreover, it shows, instead of five segments, only four, the first of which is abbreviated, and the second the longest; the ovipositor hardly exceeds one-third of the length of the abdomen, while in the other *Pyrgotæ* it equals the abdomen in length. If these statements were based on Macquart's figure alone, I would have been inclined to think that the abdomen, wanting in the specimen, had been supplied by the imagination of the draughtsman; but this supposition does not hold good in presence of the fact, that Macquart mentions expressly, that he had a female before him; and we know that the sex of a *Pyrgota* can only be recognized by the structure of the abdomen. Macquart also says that the ovipositor is flattened, which is not in the least the case with *P. millepunctata*. These grounds seem sufficient to justify the belief that Macquart's *Oxycephala maculipennis* is a different species from *P. millepunctata*, unless we assume that Macquart's specimen had the abdomen of a different species fastened to it. Should this not be the case, there is every reason to doubt whether the species is a *Pyrgota* at all. It is rather strange that in the list of the exotic species described in Macquart's

work, which is appended to his fourth supplement, *O. maculipennis* is omitted. The cause of this omission is not apparent. Should Macquart have discovered that it belonged to a different genus, he would have transferred it to that genus; but the species is altogether omitted in the list.

*Observation 2.*—*Sphecomyia valida* of Harris's Catalogue of the Insects of Massachusetts, is, according to a communication from Baron Osten-Sacken, nothing else but *Pyrgota millepunctata*. As a matter of course, Harris's name, being merely a catalogue name, has no claim of priority.

**2. *P. undata* WIED.** ♂ ♀.—Ex ochraceo ferruginea; antennarum articulus tertius secundo aequalis; seta antennalis triarticulata, articulis primis duobus subaequalibus; alarum vena longitudinalis secunda appendiculata.

Yellowish-ferruginous; the third antennal joint equal to the second in length; arista three-jointed; its first two joints of nearly equal length; the second longitudinal vein with a stump of a vein upon it. Long. corp. ♂ 0.4—0.43; ♀ cum terebrâ 0.5—0.53; long. al. 0.5—0.58.

**SYN.** *Pyrgota undata* WIED. Auss. Zweifl. II, p. 581. Tab. X, 6.

*Pyrgota undata* MACQ. Suites, etc., II, p. 423. Tab. XVIII, f. 23 (were mentioned after Wiedemann).

*Myopa nigripennis*, GRAY, Anim. Kingd. Tab. 125, f. 5.

*Orycephala fuscipennis* MACQ. Dipt. Exot. II, 3, p. 198. Tab. XXVI, 6.

*Sphecomyia undata* HARRIS, Cat. Ins. Mass.

*Pyrgota undata* GERST. Stett. Ent. Zeit. xxi, p. 188.

Yellowish-ferruginous or more ochre-brownish. Front rather broad, projecting almost in the shape of a tower, and with a short, rather inconspicuous pubescence; without stronger bristles in the region of the vertex or round the place where the ocelli usually are. Antennæ yellow; the first two joints with a yellowish pubescence; the third sometimes ochre-brown, of the same length as the second. Arista distinctly three-jointed; the first two joints almost of equal length. The face very much retreating when seen in profile; the very deep antennal foveæ reach only to its middle and are separated by a very low ridge, which is usually tinged with brown; below them, the middle portion of the face is remarkably narrow, groove-like and bordered on each side by a brownish-black ridge. A brown or brownish-black, somewhat curved stripe generally extends from the middle of the inner orbit of the eyes towards the region of the antennæ.

The oral opening is cut obliquely upwards; the but little developed clypeus is tinged with blackish; the rather broad palpi are usually tinged with yellowish-red towards the tip, sometimes they are altogether ferruginous. The thoracic dorsum has an extended ferruginous-brown spot upon it, formed by the almost complete coalescence of a broad intermediate stripe with two broad lateral stripes, which are abbreviated in front. The meta-thorax and the greater part of the pleuræ are often tinged with dark pitch-brown. The coloring of the abdomen on the first two segments, and also at the basis and along the middle of the following ones, often becomes pitch-brown or brownish-black, this is especially often the case in male specimens. The first abdominal segment is very much elongated in both sexes; in the male it is not quite as long as the three remaining segments taken together; in the female, the last four segments are so much shortened, that, taken together, they are much shorter than the first joint. The capsule-shaped ovipositor is conical, bent downward towards its end. The feet are ochre-yellowish, but the femora brown up to the tip; the tibiæ likewise are more or less infuscated, except the basis and the extreme tip. Wings large, the greater portion of them is uniformly tinged with brown, which color covers the costal, marginal, submarginal, the first posterior and the discal cells, also the basal cells, with the exception of a pale stripe in the anal cell, moreover, this color forms a broad border along the inner portion of the second posterior cell, and a narrower one along the anterior margin of the third posterior cell; within this brown coloring some specimens do not show any paler spots, the majority, however, show, in the submarginal cell, a little beyond the small crossvein, a rounded or oval, almost hyaline spot, which attains sometimes a considerable size; moreover, a great many specimens show some scattered, small, hyaline dots, not far from the end of the same cell, of the first posterior and of the discal cells; the posterior limit of the brown coloring has a whitish-hyaline border, which, following the course of that limit, forms a steep curve in the second posterior cell; in the third posterior cell it takes the shape of a gently arched longitudinal stripe; within this border, the surface of the wing has a uniform brownish coloring, which is perceptibly more intense only in the region of the axillary incision; in some cases, near the posterior side of the sixth longitudinal vein, a little

beyond the end of the anal cell, there is a small, almost hyaline spot; the alula is almost hyaline, or infuscated towards the posterior margin only. The second longitudinal vein, opposite the posterior crossvein, shows a small fold, the tip of which, directed backwards, emits a short stump of a vein; the last section of the fourth longitudinal vein is very strongly curved; the posterior angle of the anal cell forms a sharp, but not very acute angle.

*Hab.* United States; Carolina (Zimmerman), Massachusetts (Harris), etc.

*Observation.*—I am not able to compare the figure of *Myopa nigripennis* Gray, but I do not hesitate, on Gerstæcker's authority, to place this name among the synonyms of *P. undata*. The synonymy of *Sphecomyia undata* Harris is based upon a statement of Mr. Walker, who seems to have received specimens from the author.

**3. *P. vespertilio* GZST.** ♂.—Antennarum articulo tertio præcedente plus dimidio brevior, rotundato ovato, fusco, aristæ articulo primo brevissimo, secundo elongato: fronte oculis duplo latiore, palpis filiformibus: alis venâ longitudinali secundâ nec fractâ, nec appendiculatâ, alulâ strigisque duabus marginis posterioris hyalinis.

Third antennal joint not half so long as the second, rounded oval, brown; the first joint of the arista very short, the second elongated; front double the breadth of the eyes; palpi linear; second longitudinal vein of the wings without fold or stump of a vein; the alula and two stripes near the posterior margin hyaline. Long. corp. 0.64; long. al. 0.56.

*SYN. Pyrgota vespertilio* GZST. Stett. Entom. Zeitschr. xxi, p. 189, Tab. II, f. 8.

Head comparatively stouter than in the preceding species; front, when viewed from above, and taken as far as the anterior border of the eyes, at least by one-half broader than long; the gibbosity projecting over the eyes is not of equal breadth, as in *P. undata*, but conically attenuated anteriorly; its tip is as broadly truncated as in the other species; viewed in profile, this projection is as high as in *P. undata*; its anterior side, however, does not ascend in a straight line, but shows a strong convexity, so that the tip itself is retreating. The cheeks are considerably broader and more sunken. The eyes are comparatively smaller, the excavated upper part of the face perceptibly shorter. The coloring on the front, especially on the inside of the eyes and

upon the gibbosity, is darker, more brown; upon the cheeks, with the exception of the ferruginous-yellow border of the eyes, chocolate-brown; the two black ridges, bordering the middle of the face, are present, as in *P. undata*, but even more distinctly marked and descending lower. The first two joints of the antennæ are pale ferruginous-yellow; the third joint dark-brown; the arista ferruginous-yellow at the basis, whitish towards the tip; the second antennal joint is not quite as long as in the preceding species, chiefly because it is but very little less drawn out forwards above than below; the last joint is at least by one half shorter than the second, rounded oval, ending in a blunt point; the arista is inserted on the middle of its length, on the outside, near the upper margin; of its two basal joints the second has four times the length of the very short first joint. The palpi are slender, filiform, tinged with brown, like the proboscis. The thoracic dorsum shows three deep black stripes; the middle one is very broad, begins at the anterior margin and ends some distance before the scutellum; the lateral stripes are abbreviated anteriorly and posteriorly; the portion of them behind the suture is larger than that in front of it. The greater part of the pleuræ, a spot on each side at the posterior margin of the scutellum, as well as the metathorax, dark-brown. On the abdomen, the anterior part and the middle line of the first segment are pitch-black and somewhat shining; on each of the following three segments is a triangular spot, of the same coloring, the basis of which is directed anteriorly, and which occupies the whole breadth of the segment. The upper part of the abdomen has delicate transverse grooves, the under side on the contrary is strongly grooved in a longitudinal direction, opaque velvet-black, with a narrow, ochre-yellow middle line; the projecting male organ of copulation is of a shining reddish-brown. The feet are light ferruginous, with yellow hairs; the femora, to the exclusion of the tip and tibiæ, with the exception of the basis and of the extreme tip, are chestnut-brown. The second longitudinal vein of the wings is hardly perceptibly broken and without any vestige of a stump; the wings in general are comparatively shorter than in *P. undata*, darker and more evenly earth-brown; a very delicate streak near the posterior border of the first longitudinal vein, not far from the origin of the second vein, the whole alula and two streaks near the posterior margin, the position of which



corresponds to the entirely discolored spots in *P. undata*, are hyaline. These two streaks have a very definite outline, and the space beyond them is as dark-brown as the remainder of the wing; the longer one is almost straight, the shorter one sickle-shaped. The halteres are pale ferruginous-yellow.

*Hab.* Carolina (Zimmerman).

*Observation.*—The above description is the reproduction of that prepared by Dr. Gerstæcker, l. c., from a single specimen in the Berlin Museum. I have had a passing view of the specimen; it is very like *P. undata*. The differences in coloring, noticed by this author, are in my opinion of but little importance, as most of them occur among the varieties of the very variable *P. undata*. More important are the plastic differences, mentioned by Dr. Gerstæcker. Although the shape of the head in different specimens of *P. undata* is variable (evidently, however, in consequence of different degrees of shrinkage in drying), although the size of the third antennal joint is subject to slight variations, and although the relative length of the first two joints of the arista is not altogether constant, it is hardly credible that all these discrepancies should reach the degree which Dr. Gerstæcker noticed in his *P. vespertilio*.

**4. *P. pterophorina* GERST.** ♀.—Antennarum articulo tertio præcedente paulo longiore, oblongo ovato, aristâ brevissimâ, crassâ: fronte oculis latiore, fortiter prolongatâ, palpis ooclearibus; alis latis, venâ longitudinali secundâ geniculatâ, nec appendiculatâ, fuscis; alulâ, maculis duabus, posticis magnis, semilunaribus, guttisque duabus hyalinis.

The third antennal joint is somewhat longer than the preceding one, elongated-oval, with a very short, stout arista; front broader than the eyes, very much prolonged; palpi spoon-shaped; wings broad, with a second longitudinal vein which is geniculate, but has no stump of a vein upon it; coloring on the wings brown; alula, two large crescent shaped spaces on the posterior margin and two dots hyaline. Long. corp. 0.4; long. al. 0.44.

*SYN. Pyrgota pterophorina* GERST., Stett. Entom. Zeit. xxi, p. 190, Tab. II, f. 6

Body small, slender, pale-ferruginous, shining. Head, viewed from above, by one-third longer than broad; front broader than the eyes, but, taken as far as the anterior margin of the eyes, nevertheless longer than broad; the gibbosity only a little shorter

and very little attenuated anteriorly; viewed in profile, this gibbosity is less elevated than in the two preceding species; on the contrary, it is, to its very much protruding tip, almost on the same level with the remaining portion of the front; this causes the anterior margin, which, with a slight convexity, is strongly retreating, to lie almost entirely on the under side; cheeks likewise broader and descending lower than in *P. undata*. The coloring of the head is altogether pale-ferruginous, even the black lines, bordering the middle portion of the face, are wanting. The antennæ likewise are altogether ferruginous-yellow; the two apical joints are almost of equal length; the third appears a little longer, only when viewed from the outside, along the lower margin, because, at this point, this joint is less covered by the second than above and on the inside; the first two joints are beset with blackish bristles, as in the two preceding species; the third joint is elongated-oval; the arista is inserted in the middle of its length, near the upper margin; it is stout and very short, shorter than the third antennal joint; the second joint of the arista is one-half longer than the first; the styliform third joint is but little longer than the first two taken together. Palpi elongated, slightly curved, somewhat spoon-shaped at the tip, pale ferruginous-yellow, with black bristles; the proboscis brown. Thorax uniformly ferruginous-yellow; clothed, as the head, with delicate black bristles. Abdomen of a similar color, but more shining, beset with long black bristles, forming bunches, especially on the sides; the upper side of the first abdominal segment is infuscated beyond the middle. The horny capsule, which forms the end of the fifth segment of the abdomen of the female, has, in profile, the appearance of a sparrow's bill; it is convex above, concave below, obtuse at the tip and somewhat shorter than the last three abdominal segments taken together. Feet perceptibly longer and more slender than in the two preceding species, with dense and rather long hairs, light brown; the basal third of the tibiæ and the tarsi pale yellowish; the hind tibiæ are much more incrassated toward the tip than the middle ones. Wings remarkably broad, obtusely rounded at the apex; the second longitudinal vein strongly bent and then broken in the shape of an angle, but without stump of a vein; ground color of a saturate earth-brown; a trapezoidal spot, extending from the

costa to the third longitudinal vein and situated before the break in the second vein, a round spot between both crossveins, the alula and two large crescents on the posterior margin hyaline; the crescents show a pale shade of brownish towards the posterior margin. Halteres altogether pale yellow.

*Hab.* Carolina (Zimmerman).

*Observation 1.*—The above is a translation of Gerstæcker's description of the specimens in the Berlin Museum. The species is distinguished enough to render the discussion of its specific rights useless. I will only notice here, that when the author says that the fifth abdominal segment in the female gradually passes into the capsule-shaped ovipositor, this expression is not to be understood literally; in the two species which I have seen, such a transition is not visible. When the author calls the first two antennal joints of *P. pterophorina* "beset with blackish bristles, as in the preceding species (*P. undata* and *vespertilio*)," I would observe that in *P. undata* this pubescence is in reality yellow, and assumes a ferruginous or even blackish tinge only when seen against the light.

*Observation 2.*—A fifth American species is described by Macquart (Dipt. Exot. Suppl. IV, p. 281, Tab. XXVI, f. 1) as *Oxycephala fenestrata*. His data are not even sufficient to ascertain whether the species really is a *Pyrgota*. Moreover it is not distinctly stated whether this species belongs to North America.

## Second Section: PLATYSTOMINA.

### Gen. I. AMPHICNEPHES nov. gen.

*Charact.*—*Front* of medium breadth, not narrower anteriorly.

*Antennæ* reaching down to the edge of the mouth.

*Face* excavated, without distinct antennal foveæ; occiput but little turgid; eyes high; cheeks narrow.

*Scutellum* large, flat, with four bristles.

*Wings* very broad; the longitudinal veins straight and conspicuously diverging; anal cell shorter than the preceding basal cell; its posterior angle rounded.

Small, metallic-colored species, the wings of which show a picture not unlike that of the species of *Platystoma*, and the general habitus of which is less like the species of *Rivellia* than

those of *Platystoma*. They are, however, easily distinguished from the latter by the narrower front, the much less turgid occiput, the larger and flatter scutellum and the much broader wings, with straight, very much diverging longitudinal veins.

**1. *A. pertusus* n. sp.** ♂ and ♀.—(Tab. VIII, f. 1) Viridis, nitidus alæ nigræ, guttis et fasciâ subapicali hyalinis.

Green, shining; wings black with hyaline dots and a hyaline crossband before the tip. Long. corp. 0.13—0.14; long. al. 0.11—0.12.

Dark metallic-green, shining. Head black; the front blackish-brown, even, rather long, but only of a medium breadth, not narrowed anteriorly; the ocelli are closely approximated to each other near the edge of the vertex; the small ocellar triangle and the little stripes running down at the corners of the vertex are of a shining blackish-green. Bristles of the vertex rather long, directed backwards; the bristle which is in front of them on each side is short; the ocellar bristles are not distinct. Antennæ reaching down to the edge of the mouth, brownish-yellow; their narrow third joint is blackish at the tip; often the greater part of its outer side is brownish. Face excavated; its lateral portions very narrow; antennal foveæ indistinct. The shining black clypeus broad. Palpi broad, shining black, with a paler border on the under side and at the tip; proboscis of moderate thickness; mentum but little swollen. Eyes much higher than broad; cheeks narrow; occiput but little turgid. Thorax very delicately transversely aciculate. Scutellum large, flat, weakly rugose, with four bristles. Abdomen more distinctly rugose. Ovipositor black, considerably extensile. Feet black, brownish-black in less mature specimens; the first joint of the front and hind tarsi and the first three joints of the middle tarsi of a dirty ochre-yellow. Halteres black, tegulæ but little developed. Wings rather broad, black, more grayish-black near the hind margin; immediately before their apex is a conspicuous, arcuated, hyaline crossband; before this band there is a moderate number of hyaline dots of regular shape, which become more sparse towards the anterior margin; five dots which are nearest to the crossband form a row, parallel to the latter; the blackish-gray coloring near the hind margin of the wings has no hyaline spots. The veins are much more straight than in *Platystoma* and very diverging;

the two posterior basal cells are rather striking for their large size; however, the anal cell, which has an obtuse posterior angle, is shorter than the basal cell lying in front of it; the small cross-vein is in the middle of the discal cell; the first half of this cell is by no means attenuated, as is the case in the species of *Rivellia*.

*Hab.* Carolina (Zimmerman); Washington, D. C., Connecticut (Osten-Sacken).

Gen. II. **HIMEROËSSA** nov. gen.

*Charact.*—Front of equal breadth, distinctly projecting in profile.

*Antennæ* reaching almost to the mouth, arista bare.

*Face* moderately excavated, somewhat retreating below; occiput moderately turgid, eyes high; cheeks narrow.

*Scutellum* convex; with six bristles.

*Wings*: marginal and submarginal cells very narrow; second section of the fourth longitudinal vein straight; posterior crossvein prolonged beyond the fourth vein; posterior angle of the anal cell rounded.

As I have seen only a single species of this genus, the one which is described below, the definition of the generic character can naturally be only a provisional one. Should the peculiar prolongation of the posterior crossvein, which distinguishes *H. pretiosa*, be wanting in some allied species, it would then be necessary to omit this character from the definition of the genus; the remaining characters are amply sufficient for the purpose.

**1. *H. pretiosa* n. sp. ♂.**—(Tab. VIII, f. 2.) Rufo testacea, abdomine violaceo, pedibus anticis totis, posteriorumque tibiis et tarsis nigris; alæ hyalinæ, inæquali costæ limbo et fasciâ tenui subinterrupta nigro-fuscis.

Yellowish-red, with a violet abdomen; the front feet altogether, the tibiae and tarsi of the four posterior feet, black; wings hyaline with an irregular costal border and a narrow, somewhat interrupted crossband, blackish-brown. Long. corp. 0.38, long. al. 0.3.

Yellowish-red, shining. Front darker, opaque, of equal breadth, with very indistinct traces of flat pits and a very delicate border of white pollen along the orbits; distinctly projecting in profile; the little stripes, descending from the vertex along the sides of the front, and the ocellar triangle are distinct, and somewhat more shining; the latter is somewhat larger than

usual; ocelli very near the edge of the vertex, rather large, but little approximated; the four bristles on the edge of the vertex rather strong; the lateral, as well as the ocellar bristles replaced by shorter, bristle-like hairs. Antennæ of the coloring of the body, almost reaching to the anterior edge of the oral opening; arista bare. Face but moderately concave, somewhat retreating on the under side, pollinose with white, except in the vicinity of the oral opening; in the well-marked foveæ this pollen is thicker and more conspicuous; the lateral portions of the face, bordering on the eyes, are very narrow and likewise clothed with white pollen. Eyes much higher than broad; cheeks narrow. Clypeus of a moderate breadth, distinctly projecting over the edge of the mouth; palpi not very broad, almost ferruginous. Proboscis rather stout; occiput moderately turgid. The whole thorax and the convex scutellum shining, with a very faint trace of a reddish metallic reflection. Scutellum with six bristles. Abdomen of a metallic reddish-violet coloring, which, in a different light, assumes upon the first three segments a bronze-green tinge; this is not the case with the last segment. Front feet with the coxæ brownish-black; on the four posterior feet the tibiæ and tarsi alone have this coloring; the coxæ and femora have the color of the thorax. Halteres yellowish-red, with an infuscated knob. Wings hyaline, with brown veins, which are not in the least sinuous; their anterior margin has a conspicuous, but unequal brown border, which, near the apex, extends as far as the fourth vein; from the root of the wing to the small crossvein, which is still included in this border, it becomes gradually broader and reaches here almost to the fifth longitudinal vein; it contracts immediately beyond the small crossvein, to the second longitudinal vein; opposite the posterior crossvein it expands again towards the third longitudinal vein, and runs immediately behind this vein as far as the apex of the wing, where it suddenly turns towards the fourth longitudinal vein, which forms the limit of this dark border; the very steep posterior crossvein projects in an unusual way beyond the fourth longitudinal vein; it is bordered with brown: this border forms a narrow, perpendicular cross-band, which growing paler and more indistinct, extends to the dark border of the anterior margin, or quite near it; the costal cell is clay-yellow, except at the basis and at the tip, which are more brownish. The marginal and submarginal cells are re-

markedly narrow; the small crossvein is in the middle of the discal cell; the posterior angle of the anal cell is rounded and the last section of the fourth longitudinal vein is parallel to the third.

*Hab.* Cuba (Gundlach).

Gen. III. **RIVELLIA** R. Desv.

*Charact.*—*Front* of equal breadth, not projecting in profile.

*Antennæ* usually reaching down to the margin of the mouth; third joint long and narrow; arista with a very short pubescence.

*Face* rather excavated, its lower part projecting; the lateral portions very narrow; clypeus broad; occiput moderately turgid; eyes high; cheeks moderately broad.

*Scutellum* convex, with four bristles.

*Wings*: Marginal and submarginal cells comparatively broad; the second section of the fourth longitudinal vein remarkably sinuate, with the convexity encroaching upon the discal cell, so that the latter appears much narrower before the small crossvein than behind it; the last section of the fourth longitudinal vein is parallel to the third vein or very slightly diverging; posterior angle of the anal cell rounded.

A large number of closely resembling species belong to this genus; the picture of the wings of most of them is nearly the same, so that this picture alone helps to recognize the species belonging here; it consists of four brown or blackish-brown crossbands; the first starts from the root of the wing and is the most oblique of all and the shortest; the second, somewhat longer and less oblique, runs over the small crossvein; the third, which covers the posterior crossvein, is perpendicular and reaches from the anterior to the posterior margin of the wing; the fourth starts from the anterior margin, near the origin of the third band, and forms a border along the apex of the wing. The North American fauna seems to abound in these species. The apparently total absence of plastic differences between them and the, as it seems, not unimportant variation in the coloring of some of them, render their separation very difficult, especially when there are only single specimens for comparison. I hope not to have gone amiss in the definition of those which I know. Whether I was mistaken or not, those may judge who have the opportunity of observing these species in life.

Among the species described below, *Rivellia conjuncta* is the

only one which does not belong to the difficult group just characterized; it is distinguished from it not only by a different picture of the wings, but also by some easily tangible plastic differences.

1st Group. *Crossbands contiguous near the posterior margin.*

**1. *R. conjuncta* n. sp.** ♀.—(Tab. VIII, f. 3.) Nigro-viridis, pedibus præter tarsorum basim nigris, tribus primis alarum fasciis postice coherentibus.

Blackish-green; the feet, with the exception of the root of the tarsi, black; the first three crossbands of the wings contiguous posteriorly. Long. corp. 0.16; long. al. 0.14.

Blackish-green, shining. Front moderately broad, dusky ferruginous-brown, almost black, laterally with a rather broad border, pollinose with white. Antennæ reaching almost down to the edge of the mouth, brick-red, except the third joint which turns brownish or blackish towards its tip. Face and clypeus metallic-black. Feet black; the basis of the tarsi brick-red or dirty reddish-yellow to a considerable extent. Halteres black. Wings hyaline; the four crossbands much broader than in the following species, especially the first; the second coalesces with the first in the discal cell and the third unites with the first near the posterior margin of the wing; the band which forms a border along the end of the anterior margin and the apex is connected in the usual way with the third, at the anterior margin. The small crossvein is but little beyond the middle of the discal cell; the second section of the fourth longitudinal vein is strongly arcuated, and the posterior crossveins bisinuate.

*Hab.* Maryland (Osten-Sacken).

2d Group. *Crossbands separated near the posterior margin.*

**2. *R. viridulans* R. Desv.** ♂ ♀.—(Tab. VIII, f. 4.) Nigro-viridis, interdum chalybesceus, pedibus præter tarsorum basim nigris, primis tribus alarum fasciis separatis.

Blackish-green, sometimes more steel-blue; feet, with the exception of the root of the tarsi, black; the first three crossbands of the wings isolated from each other. Long. corp. 0.18—0.21; long. al. 0.15—0.2.

*Syn.* *Rivellia viridulans* R. Desv. Myod. p. 729, 2.

*Trypeta quadrifasciata* HARRIS, Cat. Ins. Mass.



*Ortalis Ortoeda* WALK. List, IV, p. 992.

*Ortalis quadrifasciata* WALK. List, IV, p. 993.

*Herina rufitarsis* MACQ. Dipt. Exot. Suppl. V, p. 123, 7.

*Tephritis melliginis* FITCH, First Rep. 65.

Blackish-green, shining; the upper side of the thorax sometimes less so; recently excluded specimens acquire a somewhat steel-blue tinge after drying. Front reddish-brown, often very dark, of the usual breadth, with a very narrow border of white pollen on each side. Face and clypeus metallic black; the narrow lateral portions of the face, bordering on the eyes, brownish-red, more seldom dark-brown. Antennæ reaching to the edge of the mouth, brick-red or yellowish-red; the third joint gradually turning black towards the tip. Ovipositor and feet black; the tips of the four anterior tibiæ usually brownish brick-red; the first joint of the two front tarsi and the first two joints of the four posterior tarsi pale brick-red. Crossbands of the wings black, rather narrow; the first three, which are entirely separated from each other, reach from the anterior margin to the fifth longitudinal vein; the fourth band, bordering the end of the anterior margin and the apex, is often connected with the third only by a rather narrow black border of the anterior margin; the portion of the costal cell between the first and the second crossbands has a dingy, somewhat yellowish appearance. The small crossvein is far beyond the middle of the discal cell and the second section of the fourth longitudinal vein is very much arcuated. Halteres black.

*Hab.* New York; Georgia; Distr. Columbia (Osten-Sacken).

*Observation 1.*—The attentive reader of Walker's description of *Ortalis Ortoeda* will easily notice that, before the end of the fourth line, previous to the comma, several words have been accidentally omitted, so that the end of the sentence does not refer, as it should, to the second, but to the third crossband. What Mr. Walker meant to say results sufficiently from the next description, that of *O. quadrifasciata*, which reproduces again the present, apparently very common, species. The fact that the measurements of *O. Ortoeda* and *quadrifasciata* are different in Walker does not prevent me from considering them as one and the same species. Under the former name Walker describes a male; under the latter, a female; hence, the greater size of the latter has nothing surprising. Instead of the length of the single

wing, Walker gives the breadth of the wings from apex to apex, a datum which is to be obtained only by approximation. This breadth in *O. Ortoeda* is said to be three, in *O. quadrifasciata* four lines, a difference which is somewhat considerable, but, owing to its uncertain nature, not to be relied upon exclusively for separating the two species, as the female of *R. viridulans* really has longer wings than the male. The quotation from Harris's Catalogue has been introduced upon the authority of Walker, who seems to have had original specimens of this author; but as the species has never been described, the quotation might as well have been omitted. That *Herina rufilarsis* Macq. belongs here is not doubtful. I have been able to compare a typical specimen of *Tephritis melliginis* Fitch.

*Observation 2.*—The following species agree so much with *R. viridulans* in the breadth of the front, the shape and the length of the antennæ, and in the venation, that every statement about these points would be useless. In speaking of the picture of the wings, a statement about the points of difference will be more useful towards discriminating the species than a detailed description.

**3. *R. quadrifasciata* Macq.** ♂.—(Tab. VIII, f. 5.) Thorace viridi, capite præter occiput, abdomine, pedibus, halteribusque luteis.

Thorax green; the head, with the exception of the occiput, the abdomen, the feet, and the halteres, dark-yellow. Long. corp. 0.2; long. al. 0.19.

**SYN.** *Herina quadrifasciata* Macq. Suites, etc., II, p. 433, 8.

Head dark-yellow, the occiput metallic dark-green. Front dusky red, with a narrow border of white pollen on each side. Antennæ dark yellowish-red; the third joint, with the exception of the root, brown; blackish towards the tip. Palpi dark-yellow. Thorax, including the scutellum, of a blackish-green, metallic coloring, shining. Abdomen dark-yellow, more brownish-yellow towards its end. Coxæ and feet dark-yellow; hind tibiæ yellowish-brown; the last four joints of the front tarsi, and the last three, more seldom the last four, joints of the middle and hind tarsi infuscated. Halteres dark-yellow. The crossbands on the wings as narrow and nearly in the same position as in *R. viridulans*, but less dark; the first band is narrower and crosses the fourth longitudinal vein but very little; the second reaches not

quite as far as the fifth longitudinal vein; the hyaline interval between them is broader and the intervening portion of the costal cell of a darker coloring than in *R. viridulans*; the costa itself, from the extreme basis as far as about the middle of the costal cell, is of a dirty-yellowish coloring.

*Hab.* Nebraska (?). [I possess a specimen from Washington, D. C., which agrees exactly with the above description. O. S.]

**4. *R. variabilis* n. sp.** ♂.—(Tab. VIII, f. 6.) Rufo-testacea, capite pectoreque piceis, abdomine nigro-piceo, basin versus plerumque dilutius piceo, pedibus luteis, tibiis posticis tarsorumque apice fuscis.

Brick-red; head and chest pitch-brown; abdomen pitch-black, towards the basis usually of a lighter pitch-brown; feet dark yellow; hind tibiæ and the tip of all the tarsi brown. Long. corp. 0.18—0.21; long. al. 0.15—0.2.

Brick-red. Head pitch-brown or reddish-brown. Front of an opaque dark-red coloring, on each side near the orbit with a very narrow border of white pollen. Antennæ reaching down to the mouth; the first two joints dark reddish-yellow; the third, with the exception of the basis, dark-brown, blackish towards the tip. Palpi dark-brown. The chest and the lower part of the pleuræ dark pitch-brown. Abdomen pitch-black, generally lighter pitch-brown near the basis. Coxæ and feet dark-yellow; the four anterior tibiæ but little infuscated; the hind tibiæ and the last three or four tarsal joints dark-brown. Halteres dark-brown. The picture of the wings almost entirely like that of *R. quadri-fasciata* in coloring and design, only the first two crossbands are a trifle longer and the first a little broader; the brown coloring in the anterior basal cell is a little less extended.

*Hab.* District Columbia (Osten-Sacken).

*Observation.*—I have a female, from the same locality, which I think belongs to the present species. It differs from the male, described above, in having the antennæ of an altogether dark-yellow coloring, except the slightly infuscated tip of their third joint; the color in the middle of the thoracic dorsum almost verges on blackish; the first crossband on the wings is a little longer, the front and middle tibiæ do not show any distinct infuscation and the tip of the tarsi is but little infuscated.

5. *R. flavimana* n. sp. ♂ ♀.—(Tab. VIII, f. 7.) Viridi-nigra, vel nigro-chalybea, pedibus anticis luteis, posterioribus semper ex parte, plerumque maximâ ex parte, nigris vel fasciis.

Greenish-black, or more bluish-black; the front feet dark-yellow, the hind feet partly, and usually for the most part, black or bluish-brown. Long. corp. 0.16; long. al. 0.14.

SYN. ? *Herina metallica* v. d. WULP. Tijdschr. voor. Ent. x, p. 154. Tab. V, f. 10.

Very like *R. viridulans*, but easily distinguished by its smaller size and the paler, although very variable, coloring of the feet. Metallic blackish-green or almost blackish-blue. Head shining black; occiput of a metallic greenish-black; front dusky reddish-brown, often blackish-brown, on each side near the orbit with a very narrow border of white pollen. The first two antennal joints brownish-red, the third blackish-brown or black. The coloring of the abdomen towards the tip, in the male, verges more on bronze-black; the only female which I can compare has no trace of this color. Fore coxæ and tibiæ yellowish; the upper side of the femora and the basis of the tibiæ very seldom show a trace of infuscation. The four posterior feet have the coxæ, femora, and tibiæ black or brownish-black, the tarsi yellow. The above-mentioned female has the tip of the middle femora and the middle tibiæ, with the exception of the dark-brown basal third, of a brownish-yellow color; the tips of the tarsi in this specimen are hardly infuscated at all, while the male specimens have the three or four terminal joints of the front tarsi and the last three or four joints of the middle and hind feet somewhat dark-brownish. Halteres brownish-black. The picture of the wings recalls, in design and coloring, that of *R. viridulans*, only the crossbands are a little narrower; in general also the second, and especially the first, reach less near the fifth longitudinal vein; the black coloring, which is apparent on the root of the anterior basal cell of *R. viridulans*, is wanting in *R. flavimana*, and this affords a good character for distinguishing the latter species from those allied to it.

*Hab.* Nebraska (Dr. Hayden).

*Observation 1.*—I possess a male, the four posterior feet of which, with the exception of the hind tibiæ, are yellow; it is also distinguished by the color of the antennæ, which are reddish-yellow as far as beyond the middle of the third joint, and by the

somewhat narrower crossbands. Nevertheless, I consider it only as a variety of *R. flavimana*, which seems to be very variable in the coloring of the feet.

*Observation 2.*—*Rivellia Boscii* R. Desv. cannot very well be identified with *R. flavimana*, as it is described as considerably larger than *R. viridulans*, whereas *R. flavimana* is distinctly smaller. I did not succeed in identifying this species of Rob. Desvoidy; his data concerning the coloring do not agree with *R. quadrifasciata* and *variabilis*, and *R. pallida* is still less to be taken into account.

*Observation 3.*—At first, while in possession of insufficient materials, I took *R. viridulans*, *quadrifasciata*, *variabilis*, and *flavimana* for varieties of the same species, and it is only later that more abundant materials convinced me that they are actually different, although closely allied, species. It is in conformity with my former view that I have identified with *R. viridulans* the *Herina metallica* described and figured by v. d. Wulp in the *Tijdschrift voor Entomologie*, x, p. 154, Tab. V, f. 10. If my present separation of these species be correct, the only ones which can be taken into consideration in interpreting Mr. v. d. Wulp's species are *R. Boscii*, *flavimana*, and perhaps *R. micans*. *R. Boscii* is so inaccurately described by R. Desvoidy that its identification is very difficult anyhow; but as this species is 3 lines long, that of v. d. Wulp only 1½, I consider their identity as not probable. The assumption that my *R. micans* is the *Herina metallica* of v. d. Wulp is contradicted by the very brilliant metallic-green coloring of the former. Moreover, v. d. Wulp's figure does not show, at the basis of the first basal cell, the dark coloring existing in *R. micans*, which coloring has the same extent, although not the same intensity, as in *R. viridulans*. If the correctness of the figure of the wing of *Herina metallica* could be implicitly relied upon, its specific diversity from *R. micans* would be a matter of certainty. But in this case I would have also to admit that *H. metallica* does not coincide with any of the species of *Rivellia* known to me, as the said figure differs from those species, especially in the broad interval between the first and second crossbands, which does not occur to that extent in any of them. We are forced to assume, therefore, that the figure of the wing is only of an average correctness, and to pay attention, in its interpretation, to the principal features

only. If the want of a dark coloring at the basis of the first basal cell be singled out as a characteristic feature, the supposition suggests itself that the species is identical with *R. flavimana*, which also partakes of this character; the shortening of the first two crossbands, as well as the data concerning the size and coloring of *H. metallica*, do not contradict such an assumption; even the statement about the coloring of the feet could be applied to unusually pale specimens of *R. flavimana*, although I have never met with specimens of this degree of paleness. Hence, it appears not improbable, although far from certain, that *Herina metallica* is identical with *R. flavimana*.

**6. *R. micans* n. sp.** ♀.—Speciesbus præcedentibus minor, læte æneoviridis, nitida, pedibus omnibus luteis, fasciis alarum fusco-nigris.

Smaller than the preceding species, metallic-green, shining; all the feet saturate-yellow; the crossbands on the wings brownish-black. Long. corp. 0.13—0.15; long. al. 0.13.

Not reaching the size of *R. variabilis* and perceptibly smaller than the other preceding species; of a metallic-green, bright and shining coloring. The front, the lateral stripes on the face and the lower part of the occiput of a reddish-yellow, seldom of a brownish-red coloring; antennæ, as far as the basal third or the middle of the third joint, reddish-yellow; beyond that, brown. The abdomen shows a diluted, half-pellucid, reddish crossband at the place where the first and second segments are soldered together; in some cases this band is wanting. Coxæ and feet saturate-yellow, the former sometimes more brownish-yellow; the tarsi, towards their tips, are strongly infuscated. The picture of the wings, in its design, is not unlike that of *R. viridulans*, but is rather brownish-black than deep black; the dark crossbands are a little narrower, especially the first and second, so that the hyaline interval between them is comparatively broader, almost equal in breadth to the interval between the second and third bands (in *R. viridulans* the first interval is considerably narrower than the second); the first and second crossbands stop about the middle of the interval between the fourth and fifth longitudinal veins; however, single specimens occur in which they are shorter; in other specimens they reach very near the fifth vein; the third band, towards its end, is perceptibly narrowed. The second section of the fourth longitu-

dinal vein is less arcuated towards the small crossvein than in *R. viridulans*. The coxæ and feet are dark-yellow; the hind tibiæ, towards their end, grow gradually, but very slightly, more brownish-yellow; the tarsi, from about the basis of the third joint, dark brown.

*Hab.* Texas (Belfrage).

*Observation.*—The present species differs from all the preceding ones by the more pure and brilliant metallic-green color. Varieties of *R. flavimana*, with very pale feet, are nearest to it; but such specimens have at least the hind tibiæ, with the exception of the extreme basis and the extreme tip, brown. Moreover, they differ from *R. micans* by the coloring of the first basal cell, which is hardly perceptibly tinged with gray at its extreme basis only, while in the latter species it is infuscated up to the last third of the second basal cell.

**7. *R. pallida* n. sp.** ♂ ♀.—(Tab. VIII, f. 8.) Flavo-testacea, Rivelliæ micanti æqualis, reliquis speciebus minor, fasciis alarum nigrofusca.

Yellowish brick-red, of the size of *R. micans*, but smaller than the other species; the crossbands of the wings blackish-brown. Long. corp. 0.14—0.15; long. al. 0.13.

Yellowish brick-red. Head concolorous; front more ferruginous; on each side with a narrow border of white pollen. Antennæ of the same color with the remainder of the body, only the third joint a little blackish at the extreme tip. One of my specimens has the first two segments of the abdomen black at the basis; but this color seems to have originated after death, being produced by the contents of the abdomen. Ovipositor not darker, or but a little darker, than the rest of the abdomen. Feet dark-yellow; last two, at the utmost last three, joints of the tarsi brown. Knob of the halteres brown. The picture of the wings reminds of that of *R. flavimana*, but instead of black it is blackish-brown; the costal cell is tinged with brown at the spot only where the first crossband has its beginning, elsewhere it is of a dingy yellowish; the root of the first basal cell shows, as in *R. flavimana*, no dark coloring; the first and the second crossbands usually reach very near the fifth longitudinal vein. This species is easily recognized by its smaller size and lighter coloring.

*Hab.* Washington, D. C. (Osten-Sacken.)

## Gen. IV. STENOPTERINA Macq.

*Charact.*—*Body* long and narrow.

*Head* almost like that of *Dacus*; *front* of a considerable and equal breadth, somewhat projecting in profile; *face* somewhat excavated in profile, perpendicular towards the somewhat upturned anterior edge of the mouth, or but little projecting; the shallow *antennal foveae* long and narrow, not distinctly separated from the convex middle portion of the face; the lateral portions of the face very narrow; *clypeus* very large; eyes large; cheeks not very broad; occiput only moderately turgid.

*Antennae*: The first two joints short; the third narrow and very long, generally reaching a little below the anterior edge of the mouth; arista apparently bare, or with a pubescence which is so short as to be almost imperceptible.

*Thorax* long and narrow; the transverse suture runs across the whole dorsum in the shape of a shallow depression; viewed laterally, the thorax appears remarkably attenuated towards its anterior end, as the pectus is truncated obliquely in front; *scutellum* with four bristles.

*Abdomen* remarkably narrow; the first segment more or less prolonged in the male.

*Feet* slender; the fore coxae very long, inserted remarkably near the collum, and unusually movable at the point of insertion.

*Wings* rather narrow; stigma long and narrow; small crossvein oblique, inserted more or less beyond the middle of the long discal cell; second section of the fourth longitudinal vein straight; posterior angle of the anal cell rounded; the picture of the wings consists chiefly in a dark border of the costa, reaching from the basis of the stigma to the apex of the wing, and in the darker coloring of the entire anterior basal cell, to which, in most of the species, is added a brown cloud along the posterior crossvein.

The great uncertainty which seems to have hitherto prevailed concerning the characters of the genus *Stenopterina* has induced me to enter in more detail about them than about the other genera. If my limitation of this genus be correct, it will contain only species closely related in their plastic characters. Their venation alone shows some differences; some species have the third and fourth longitudinal veins convergent towards their ends, the second longitudinal vein perceptibly shorter, more distant from the costa, and meeting it at a less acute angle; other species show the opposite of all these characters. As far as I can judge at present, the species of the former group seem to belong principally to the old world.



*S. ænea* Wied. and *brevipes* F. may be considered as the types of the genus.

1. *S. cærulescens* n. sp. ♂.—Viridi-chalybea, humeris concoloribus, thoracis dorso magis violaceo, halteribus nigris, alarum hyalinarum limbo costali inde a venæ auxiliariæ apice usque ad venam quartam pertinente, cellulâ basali primâ et venæ transversalis posterioris limbo fusco-nigris.

Greenish-steelblue, with concolorous humeri and the thoracic dorsum more violet; halteres black; wings hyaline, a costal border, reaching from the end of the auxiliary to the end of the fourth longitudinal vein, the first basal cell and a border along the posterior crossvein brownish-black. Long. corp. 0.32—0.39; long. al. 0.26—0.31.

Of a greenish-steelblue coloring, which on the abdomen has a somewhat stronger admixture of green and verges on violet on the thoracic dorsum; the humeral callosities and the pleuræ have the same greenish-blue color. Head dark-yellow, almost brownish-yellow; clypeus and palpi of the same color; front strongly infuscated anteriorly, this coloring having more or less extent; at the bottom of each of the foveæ a distinct brownish-black longitudinal streak; first and second antennal joints, as well as the root of the third, to a greater or lesser extent, dark-yellow; the third joint, towards its end, becomes more and more brown, even brownish-black. The last abdominal segment is only a little shorter than the penultimate. The hairs on thorax and abdomen are whitish, with the exception of the few and comparatively short bristles on the posterior end of the thoracic dorsum and of the four bristles of the scutellum. The coloring of the coxæ and feet is very variable, as that of the front and of the antennæ; the palest specimens in my possession have brownish-yellow coxæ, more yellowish feet, with a dark metallic streak, reflecting greenish-blue, upon the anterior side of the hind femora, and with tarsi which are dark-brown towards the tip; the darkest specimens in my collection have metallic-black coxæ, the femora almost black, with a bright metallic bluish-green lustre, excepting the tips of all the femora, which are brownish-red, and of the brownish-red basis of the middle ones; tibiæ and tarsi dark brownish-red; the latter, towards their end, colored with brownish-black to a considerable extent. Halteres black, only the basis of their stem a little paler. Wings hyaline;

their brownish-black picture consists of a narrow border along the anterior margin, which reaches from the end of the auxiliary vein to that of the fourth longitudinal vein, in the darker coloring of the first basal cell, which even crosses a little the small cross-vein and in a narrow border along the posterior crossvein.

*Hab.* Texas (Belfrage).

*Observation 1.*—The South American *S. brevipes* Fab. is distinguished from the present species by the ochre-yellow color of the humeri and the ferruginous-yellowish color of the halteres.

*Observation 2.*—*Herina metallica* Macq. (Dipt. Exot. II, 3, p. 208), from Mexico, is evidently no *Herina* at all, but a *Stenopterina*. It would seem possible, therefore, that *Stenopterina cærulescens* is that very species. Many of the statements in Macquart's description agree with *S. cærulescens*. It must be borne in mind, however, that these statements refer for the most part to characters which a whole series of *Stenopterinae* have in common. The statement that the wings are yellowish is not applicable to *S. cærulescens*, and none of the varieties of this species which are in my possession have the black feet mentioned in Macquart's description of *H. metallica*. Nevertheless, I would not have doubted this synonymy if I had nothing but Macquart's description to consult. The figure of the wing, however, which Macquart gives (l. c. Tab. XXIX, f. 2) sets this supposition entirely aside, by showing an unusually broad dark border along the anterior margin, by which Macquart's species differs conspicuously from *S. cærulescens* and similar species with the ordinary narrow border of the anterior margin.

#### Gen. V.<sup>1</sup> MISCHOGASTER Macq.

*Charact.*—*Front* of a considerable, rather equal, breadth; the anterior ocellus rather distant from the two others.

*Face* excavated in profile, hardly projecting below.

*Antennæ* rather long; arista with a distinct pubescence.

*Wings* narrowed towards the basis; auxiliary and first longitudinal veins closely approximated; posterior angle of the anal cell rounded.

*Abdomen* narrow, still more attenuated towards the basis; first segment beset with strong bristles; ovipositor rather conical.

The characters, as given here, are very incomplete, and require an entire revision. Unfortunately, I had no specimen at

hand for comparison, and was obliged to write from memory. The bristles on the first abdominal segment, the distance intervening between the anterior ocellus and the posterior ones, and even the shape of the ovipositor remind very much of some genera in the group of *Richardina*, from which, however, *Mischogaster* is easily distinguished by the distinct bristles on the first longitudinal vein and the unarmed femora.

The typical species of the genus is the *Cephalia femoralis* Wied. No species from North America are as yet known.

Gen. VI. **MYRMECOMYIA** R. Desv.

*Charact.*—*Body* slender, not unlike that of an ant.

*Head* comparatively large; occiput conspicuously stout behind the vertex.

*Front* of a uniform, considerable breadth, very long and steep, so that the antennæ are below the middle of the head; the very large lateral stripes of the front have wrinkle-shaped cross impressions.

*Antennæ* reaching a little below the anterior edge of the mouth; arista with a rather short pubescence.

*Front* convex, not excavated in profile, but descending in an inclined plane; clypeus of a moderate transverse diameter; cheeks rather broad.

*Thorax* somewhat narrowed anteriorly; *scutellum* small, with two bristles.

*Abdomen* very much attenuated at the basis; the narrow first segment without bristles; about its middle it is so coarctate that its anterior portion assumes the shape of a knot.

*Feet* very slender.

*Tegulae* wanting; *wings* narrow, running into a point towards the basis, so that the posterior angle of the wing and the alula are wanting; auxiliary and first longitudinal veins closely approximated; the two posterior basal cells small; the posterior angle of the anal cell rather sharp.

The very peculiar structure of the head, the approximated ocelli, the absence of bristles on the first abdominal segment and its peculiar coarctation, sufficiently distinguish this genus from *Mischogaster*. The species upon which it was founded by R. Desvoidy are unfortunately unknown to me, so that I cannot affirm with certainty whether the characters as based by me upon the species described below would in all particulars apply to them. Judging by his statements, however, it seems very probable that the discrepancies are not important.

*Myrmecomyia* is not only very like *Cephalia* in appearance, but closely allied to it in reality. However, they may be distinguished by the presence, in *Cephalia*, of a mesothoracic bristle, and by the absence of the coarctation of the first abdominal segment, peculiar to *Myrmecomyia*. The alulæ and tegulæ in *Cephalia*, although small, are not wanting; the posterior angle of the wing, although very shallow, is likewise apparent.

**M. myrmecoides** Loew. ♂ ♀.—(Tab. VIII, f. 9.) Nigra, alarum hyalinarum imâ basi et apice extremo nigris.

Black; wings hyaline, extreme root and apex black. Long. corp. 0.25—0.27; long. al. 0.21.

Syn. *Cephalia myrmecoides* Loew, Wien. Ent. Monatschr. IV, p. 83.

Black, glossy. Head shining black, face and cheeks usually brown. The very broad and long front, descending in a steep slope, has a very narrow middle stripe of velvet black, which does not reach much beyond the middle of the front, but is connected by a furrow with the frontal fissure; the latter is not in the shape of an arc, but of an angle. Ocelli approximated to each other. The vertex bears two strong bristles, and on both sides of them two shorter ones; moreover, far back of the ocelli there are two small erect bristlets, while there are none in the immediate vicinity of the ocelli. The conspicuously large lateral parts of the front have irregular, wrinkle-like, transverse impressions, and along the orbits a very narrow border of white pollen. Antennæ long and narrow, reaching to the anterior edge of the mouth; the first two joints brownish-red, the third black; arista with a very short pubescence. Face convex, descending obliquely in profile, but not excavated; the anterior edge of the mouth not drawn upwards; antennal foveæ indistinct; the very narrow lateral parts of the face with a thin white pollen. Eyes higher than broad. Cheeks rather broad. Clypeus projecting over the anterior edge of the mouth, however its longitudinal diameter does not equal its moderate transverse diameter; the rather broad palpi blackish-brown. Thorax rather long and narrow, broader in the region of the wings than before and behind. Scutellum very small, convex, with two bristles. The metathorax descends in an inclined plane, and is conspicuously long; the pectus rises obliquely from the middle coxæ towards the front

**coxæ.** Thoracic dorsum with a thin gray bloom, the impressions indicating the lateral beginnings of the transverse suture are more densely pollinose; the pleuræ, above the middle coxæ, are clothed with a very dense white pollen. The shining black abdomen is much narrower at its basis; its first segment is longer than each of the following ones; about its middle it is so attenuated that its smaller anterior portion is knot-shaped, the larger posterior portion funnel-shaped; the last abdominal segment is somewhat shorter than each of the two preceding ones. The comparatively large hypopygium is usually pitch-brownish, seldom blackish; the first segment of the black ovipositor is flat and rather broad. Feet very slender; anterior coxæ yellow; the four posterior coxæ yellowish-red or chestnut-brownish; all are clothed with white pollen. Front feet brownish-yellow, with pitch-brown femora; the tarsi, from the tip of the first joint, are blackish-brown; the four posterior feet are brownish-black; the knees, the extreme tip of the tibiæ and the root of the tarsi brownish brick-red; in very pale-colored specimens the light coloring of the tarsi is much more extensive. Halteres black. No tegulæ. Wings hyaline, with delicate black veins; the wings, towards the basis, are very much attenuated, without any posterior angle and without alula; auxiliary vein short, very much approximated to the first longitudinal vein; the latter rather stout, very gradually merging into the costa, so that the stigma is narrow, linear; second longitudinal vein very long and straight; the last section of the third longitudinal vein gently inflected backwards, so that it strongly diverges from the second longitudinal vein and ends in the extreme apex; small crossvein perpendicular, inserted but little beyond the middle of the long discal cell; the last section of the fourth longitudinal vein rather straight, only very little convergent towards the third; posterior crossvein straight; the two posterior basal cells comparatively small; the posterior angle of the anal cell rather acute, but not pointed; the sixth longitudinal vein rather short, but reaching distinctly to the margin. The picture of the wings consists in an obscuration of the extreme root and the extreme tip; the first extends in the costal cell a little beyond the humeral crossvein; behind the first longitudinal vein, however, it reaches as far as the posterior basal cells; the obscuration of the apex has its greatest breadth at the end of the first posterior cell; it

hardly crosses the fourth longitudinal vein posteriorly; anteriorly it extends as a rapidly contracting border along the costa as far as the end of the second longitudinal vein, so that it has rather the shape of an apical spot than of an apical border.

*Hab.* Washington, D. C. (Osten-Sacken.)

*Third Section: CEPHALINA.*

Gen. I. **TRITOKA** nov. gen.

*Charact.*—*Body* slender; abdomen narrow at the basis; feet rather long, front tibiae before the end of the upper side with a stronger bristlet.

Hairs and bristles rather short; thoracic dorsum with bristles along the sides and upon its posterior margin only.

*Antennae* long and narrow; the second joint short; arista with short hairs. Face almost shield-shaped, with rather indistinct antennal foveae.

*Palpi* very broad; proboscis rather stout, mentum but little inflated. *Wings* cuneiform towards the basis, with a very narrow alula; second longitudinal vein not conspicuously arcuated; third and fourth irregular in their course, which causes the anterior basal cell to expand before its end; first longitudinal vein beset with bristles upon the greater portion of its course; crossveins approximated to each other.

This genus contains reddish-brown and black species, with dark wings, marked with three hyaline, oblique, more or less arcuated crossbands.

1. **T. flexa** WIED. ♂ ♀.—(Tab. VIII, f. 10.) Nigra, capite thoraceque interdum fuscis; alae nigrae, fasciis hyalinis valde angustis secundâ et tertiâ arcuatis, hac ab alae apice late remotâ, venâ transversâ posteriore subnormali.

Black, head and thorax sometimes brown; the wings black, with three very narrow hyaline bands, the second and third of which are arcuated; the latter is rather remote from the apex of the wing; posterior crossvein almost perpendicular. Long. corp. 0.24—0.28; long. al. 0.21—0.23.

*SYN.* *Trypeta flexa* WIEDEMANN, Auss. Zweifl. II, p. 483, 11.

*Trypeta arcuata* WALKER, Ins. Saunders, p. 383. Tab. VIII, f. 3.

Fully colored specimens are altogether deep black; in very pale specimens, on the contrary, the whole head, the thorax, and the feet, the latter usually with the exception of the upper side of the femora, are often brown; vestiges of this color frequently

occur in a greater or lesser measure on specimens the prevailing color of which is black. Most specimens have the greater part of the front brown, some reddish-brown; the usual coloring of the antennæ, also, is more brown than black, especially towards the basis. The pubescence of the arista is short, but distinct. The front has on both sides a very narrow, the face a broader, border of white pollen; the face, also, is slightly hoary with white, which is not equally distinct in all specimens, nor from all points of view; it is most perceptible around the antennæ. The rather indistinct pollen on the thoracic dorsum forms two rather broad parallel lines. The first segment of the flattened ovipositor resembles in its nature the preceding abdominal segments, to which it is closely applied; it is clothed, like those segments, with short, black hairs. The wings are strongly cuneiform towards their basis, and towards their tip they are rounded in such a manner that the extreme apex is much nearer the posterior than the anterior margin; the second longitudinal vein is slightly wavy upon the first two-thirds of its course; its strongest curvature is just above the small crossvein; the latter is rather oblique; the posterior crossvein, on the contrary, is steep, almost perpendicular, slightly bisinuated in the shape of an S. The color of the wings is black; only very immature or faded specimens have it brownish-black; the three usual crossbands have an almost whitish tinge, and are very narrow; the first among them is so oblique that it almost assumes the appearance of a longitudinal stripe; it starts at the basis of the third posterior cell, diverges gently and moderately from the fifth longitudinal vein, becomes more and more attenuated and pointed, and ends already some distance from the posterior margin; the second pale crossband, which likewise has a very oblique position, begins at the tip of the costal cell, just before the end of the auxiliary vein, and runs to the posterior angle of the discal cell; it is perceptibly more arcuated on its anterior than on its posterior portion; the third crossband, running from the anterior to the posterior margin, likewise has a very oblique position, although less so than the second; between the posterior margin and the third longitudinal vein its course is straight; from there to the anterior margin it is more and more arcuated; the distance between the third crossband and the apex of the wing is very large, as it almost equals one-third of the length of the wing. In the imme-

diate vicinity of the small crossvein the coloring of the wing is more ferruginous-brown than black, which is especially perceptible by transmitted light; specimens also occur which have other pale streaks in one or the other of the cells.

*Hab.* Northern Wisconsin River (Kennicott); Illinois (H. Shimer).<sup>1</sup>

*Observation.*—Wiedemann probably prepared his description of *Trypeta flexa* from a very imperfectly colored specimen. A drawing of the wing, which I prepared some twenty years ago after an original specimen in the Berlin Museum, proves conclusively that *Trypeta flexa* is distinct from *Tritoxa incurva* and *cuneata*. The former is proved by the dark coloring at the tip of the wing having a much greater extent than in *T. incurva*, and by the course of the third crossband in *T. flexa*, which is not arcuated towards its end, but almost straight; in *T. cuneata* the different shape of the wing and the entirely distinct delineation of the crossbands altogether exclude the possibility of its synonymy with *T. flexa*. The figure of the wing drawn by me and above alluded to agrees with the present species so well that I consider my opinion about the identification of this species as well founded. Should this not be the case, then *T. flexa* Wied. is a species which I do not possess. The statement of Wiedemann, that the ovipositor of the female is two jointed, rests upon an error, which is easily explained away by the resemblance of the first joint with the preceding abdominal segment. That Walker's *Trypeta arcuata* is synonymous with the present species is not in the least doubtful, although in the figure of the head the arista is made too short and its pubescence too long.

**2. *T. incurva* n. sp.** ♂ ♀.—(Tab. VIII, f. 12.) Badia, abdomine nigro; alæ fuscæ, fasciis hyalinis modice angustis, secundâ et tertiâ arcuatis, hac ab alæ apice minus late quam in speciebus reliquis remotâ, venâ transversâ posteriore obliquâ.

Reddish chestnut-brown, with a black abdomen; the wings brown, with

<sup>1</sup> Mr. H. Shimer, from Mt. Carroll, Ill., informed me, in 1865, that this fly is very injurious to onion-plants, the larva occurring in the bulb. This fact has, since then, been mentioned in the *Practical Entomologist*, I, p. 4; II, p. 64 (with figures of larva and imago); *American Entomologist*, II, p. 110. Specimens of *Tritoxa incurva* were found by Mr. Shimer, together with *T. flexa*, and taken for a mere variety of that species.



only moderately narrow hyaline bands, the second and third of which are arcuated; the latter is less remote from the apex of the wing than in the other species; posterior crossvein oblique. Long. corp. 0.25—0.3; long. al. 0.22—0.26.

Reddish, chestnut-brown, with a black abdomen. Front opaque, with the exception of the edge of the vertex and of the small callosities descending from it, and bearing the bristles; along the orbits the front has a narrow border of white pollen, which also extends over the face, but is much broader here. The remainder of the face has a very thin, somewhat yellowish pollen upon it, which is most perceptible in the proximity of the antennæ. Antennæ reddish-brown; third joint darker brown towards its end; pubescence of the arista short, but distinct. The thoracic dorsum has a broad shining border upon its sides, otherwise it is opaque. Its thin whitish pollen is a little more perceptible than in *T. flexa*, and forms, as in that species, two broad, parallel longitudinal stripes, the position of which corresponds to that of the intervals between the ordinary thoracic stripes; upon the intermediate stripe between them the pollen has a somewhat yellowish tinge, and is much more dense upon the longitudinal line, which divides this stripe in two; well-preserved specimens show the white pollen on the sides of the thoracic dorsum also, while in less good specimens this is not visible, and often very little of the pollen is left on the whole surface. Scutellum, metanotum, and pleuræ are shining, the latter with a thin white bloom. Abdomen black or brownish-black, with a black pubescence, sometimes chestnut-brown on the sides of the first and second segments. The flattened first joint of the ovipositor is of the same nature as the preceding segments of the abdomen; it is very broadly truncated at the tip. The feet have the same coloring as the thorax, often, however, not only the upper side of the fore femora, the middle femora towards their basis, and the hind femora, with the exception of their last quarter, are more strongly infuscated, but also the fore tibiæ towards their tip, as well as the entire fore tarsi; the middle tarsi, with the exception of their basis and the entire hind tibiæ and hind tarsi, are dark brown. Halteres yellowish. Wings narrowed towards the basis, although not quite as cuneiform as in *T. flexa*, the portion lying beyond the sixth longitudinal vein not being quite as narrow as in that species; the end of the wing

is rounded in such a manner that the apex is equidistant from the anterior and the posterior margins; the second longitudinal vein, the course of which is rather wavy, has its strongest sinuosity only little beyond the small crossvein; the anterior end of the latter is nearer to the root of the wing than its posterior end, so that its position is entirely oblique; the posterior crossvein is oblique in the opposite direction, as its anterior end is nearer to the apex of the wing than the posterior. The coloring of the surface of the wing is a brown of unequal intensity; the design consists of the three hyaline bands usual in this genus; the portion of the surface of the wing beyond the third band is dark brown, with a large yellowish-brown spot, which leaves in the submarginal cell only a dark brown border along the margin of the wing, and, so far as it extends in this cell, also somewhat crosses the third longitudinal vein; the interval between the second and third bands, which has the shape of a crossband, is yellowish-brown, margined with dark brown on each side, and also dark brown at the end; the interval between the second and first crossbands is dark brown, with a large yellowish-brown spot, which fills up the basis of the submarginal cell, and, to a great extent, that of the first basal cell, so that in the former almost nothing is left of the dark brown color, in the latter only a border; the root of the wing is tinged with yellowish-brown as far as a little beyond the humeral crossvein; towards the place of insertion of the wing, however, the dark brown color appears again; the posterior angle of the wing, lying behind the first crossband, is only tinged with gray. The hyaline crossbands are distinctly broader than in *T. flexa*, and the last of them is much nearer the apex, so that the dark coloring of the latter assumes the shape of a broad crossband. The first hyaline crossband is so oblique that it almost assumes the appearance of a longitudinal stripe; it starts, as in *T. flexa*, from the basis of the third posterior cell, but is broader than in that species, and does not diverge from the fifth vein; gradually becoming more pointed, it ends some distance from the margin of the wing, and differs but little in intensity of coloring from the gray posterior angle of the wing; the second pale crossband, which has a very oblique position and is only gently curved, runs from the tip of the costal cell to the posterior corner of the discal cell; however, the tip of the costal cell itself is hyaline to a

very small extent only, so that the crossband appears somewhat abbreviated near the anterior margin of the wing; the third hyaline crossband, which is almost as oblique as the second, is more curved upon its posterior than upon its anterior portion.

*Hab.* Illinois (Dr. Schimer).<sup>1</sup>

**3. *T. cuneata* n. sp.** ♂ ♀.—(Tab. VIII, f. 11.) Rufo-badia, abdomine nigro; alæ fuscæ, fasciarum hyalinarum secundâ obliquâ et levissime arcuatâ, tertiâ subnormali et rectâ.

Reddish chestnut-brown, with a black abdomen; wings brown, their second hyaline crossband oblique and only gently curved; the third almost perpendicular and straight. Long. corp. 0.23—0.25; long. al. 0.21—0.22.

Reddish chestnut-brown, with a black abdomen. Front opaque, however, with the exception of the edge of the vertex and of the two callosities, descending from it, and bearing the strong frontal bristles, of a rather reddish coloring; with a very narrow border of white pollen near the orbit; this border also extends over the face, but is not very perceptible here. The remainder of the face is covered with a very delicate whitish pollen, which is more perceptible near the antennæ only. The third antennal joint, with the exception of its basis, brown; arista with a very short, yet distinctly perceptible, pubescence. Thoracic dorsum upon its sides with a broad shining border, otherwise opaque; the rather whitish pollen which covers it is very distinct in well-preserved specimens, but even in such specimens it does not form any distinct longitudinal stripes. Scutellum, metathorax, and pleuræ shining, the latter with a white bloom. Abdomen black or brownish-black, with a black pubescence, usually reddish chestnut-brown upon the sides of the first and second segments. The feet are of the color of the thorax; the fore tarsi usually altogether dark brown; the middle and hind tarsi towards their end dark-brown to a great extent. Halteres yellowish-white. Wings comparatively narrower than in *T. incurva*, attenuated to a rather cuneiform shape towards their basis; second longitudinal vein only slightly wavy; the small crossvein very steep, almost perpendicular; the posterior crossvein oblique, its anterior end somewhat nearer the apex of the wing, so that the posterior angle of

<sup>1</sup> *Tritoxa incurva* occurs together with *T. flexa*, so that Dr. Schimer, who sent me specimens of both, took it for a mere variety of his *onion-fly*.—O. S.

the discal cell is a little larger than a rectangle. The coloring of the surface of the wing is an uneven brown; the design is formed of the usual three hyaline crossbands, the first of which, however, is but little apparent. The portion of the surface of the wing lying beyond the last hyaline crossband is rather dark-brown, more brownish-yellow towards the anterior more grayish-brown towards the posterior margin; the interval between the third and second bands is dark-brown below the fourth longitudinal vein, above it, yellowish-brown with dark-brown borders; the latter are broader, even sometimes coalescent, within the submarginal cell; the interval between the second and the first hyaline crossbands is dark-brown, its inner portion more yellowish-brown; the basis of the wing yellowish-brown; beyond the fifth longitudinal vein the brown coloring still continues, but soon verges on grayish. The first crossband has the same position as in the preceding species; only it is broader, less attenuated, and much shorter; its outline can be plainly visible only when the surface of the wing is viewed in an oblique direction; the second pale crossband, which is very oblique, begins below the tip of the costal cell, in the marginal cell, and reaches as far as the fifth longitudinal vein, which it touches already before the posterior corner of the discal cell; this band is but little curved; about its middle, it is more or less expanded in the shape of an angle, in consequence of its margin (the one nearest to the apex of the wing), between the third and fourth longitudinal veins, not running in the direction of the band itself, but being more or less perpendicular to the axis of the wing; the third hyaline band, running at some distance from the apex of the wing, is very steep, but by no means entirely perpendicular, and somewhat broader anteriorly than posteriorly; it begins at the anterior margin and completely or almost completely reaches the posterior one.

*Hab.* Nebraska (Dr. Hayden).

Gen. II. **CAMPTONEURA** Macq.

*Charact.*—*Body* slender, feet rather long; the hairs very short everywhere; the thorax with bristles on the lateral and posterior margins only.

*Antennæ* long and narrow; the second joint short. *Face* almost shield-shaped, convex, with rather indistinct foveæ.

*Palpi* very broad. Proboscis rather stout, with a but moderately turgid mentum.

*Wings* broad, first longitudinal vein provided, to a great extent, with bristles; second longitudinal vein arcuated in a very striking manner; anal cell rounded at the tip; the anterior margin of the wings, at the end of the auxiliary vein, has a shallow, but very striking excision.

**1. *C. picta* FABR.** ♂ ♀.—(Tab. VIII, f. 13.) Badia, abdomine nigro; alæ nigro-fusce, maculis costalibus binis trigonis, binisque guttis discoidalibus, marginis denique postici maculâ trigonâ et strigâ obliquâ hyalinis, angulo postico et alulâ cinerascensibus.

Chestnut-brownish with a black abdomen; the wings blackish-brown; two triangular spots on the anterior margin, two dots on the middle of the wing, a triangular spot and an oblique streak beginning at the posterior margin, hyaline; posterior corner and alula grayish. Long. corp. 0.25; cum terebrâ 0.32—0.34; long. al. 0.22—0.25.

*Syn.* *Musca picta* FABRICIUS, Ent. Syst. IV, p. 355, 175.

*Dictya picta* FABRICIUS, Syst. Antl. p. 330, 18.

*Tephritis conica* FABRICIUS, Syst. Antl. p. 318, 10.

*Trypeta picta* WIED. AUSS. Zweifl. II, p. 489, 20.

*Delphinia thoracica* R. DESVOIDY, Myod. p. 720, 1.

*Camptoneura picta* MACQ. Dipt. Exot. II, 3, p. 201. Tab. XXVII, f. 4.

*Trypeta picta* WALK. List, IV, p. 1041.

Head and thorax chestnut-brownish or reddish chestnut-brown; thoracic dorsum sometimes darker brown; abdomen always black or brownish-black. Front opaque, usually more ferruginous-red than orange-red, sometimes darker, with a very narrow border of white pollen along the orbits; this border also extends over the face, but although broader here, it is less distinct, or at least more perceptible only a little distance below the antennæ. The remainder of the face is a little pollinose in the vicinity of the antennæ only. The third antennal joint is usually strongly infuscated, with the exception of its basis. Thoracic dorsum with a grayish-white pollen, which does not form any distinct stripes, while the ground color of the broad intermediate stripe is often darker than its surroundings, so that it becomes distinctly visible. Feet yellowish-brown, tarsi strongly infuscated towards their tip. Halteres whitish-yellow. Wings comparatively large and broad with a rather strongly projecting posterior angle, and a rather narrow alula; at the anterior margin there is an excision, which is very conspicuous, although it forms only an obtuse angle; it is

caused by considerable sinuous expansion of the costal cell; the second longitudinal vein is very conspicuously arcuated; the two crossveins are rather approximated and perpendicular, the posterior one somewhat curved; the posterior angle of the discal cell is acute. The coloring of the wings is blackish-brown, more yellowish-brown near the root, grayish in the posterior angle; on the anterior margin there are two triangular hyaline spots, which attain the third longitudinal vein more or less completely with their very sharp points; the first of these spots covers, near its anterior end, the tip of the costal cell and the basis of the stigma, while the second is immediately beyond the stigma; the dark crossband between these two spots is tinged with brownish-yellow inside of the marginal cell, with the exception of a brown border, which becomes narrower towards the first longitudinal vein. The stigma, towards its end, gradually assumes the same brownish-yellow coloring, so that the first hyaline spot has no well-defined limit within it. Upon the middle of the wing there are two hyaline drops, elongated in a direction perpendicular to the axis of the wing; the one is in the discal cell, somewhat this side of the small crossvein, the other in the first posterior cell, over the posterior crossvein. On the posterior margin of the wing, in the second posterior cell, there is a triangular spot, concave towards the apex of the wing, convex on the other side, which is near the posterior crossvein and separated by a narrow, brownish border from it. The sharp point of this spot is directed towards the dot in the first posterior cell, and is often connected with it, while, in other specimens, it does not even reach the fourth posterior vein. Near the basis of the wing there is a narrow, oblique, hyaline streak, beginning in the first basal cell, crossing the end of the second basal cell and entering the third posterior cell; here it runs along the sixth longitudinal vein and thus reaches the margin of the wing, where it becomes a little grayish.

*Hab.* United States, common.

*Observation.*—The description which Fabricius gives of his *Musca picta* in the *Entomologia Systematica* might suggest doubts as to its identity with the above described species, doubts, however, which I hold to be without foundation. First of all, it is certain that Wiedemann's *Trypeta picta* is identical with our species; his description, as well as the types of his collection,

proves it conclusively. Not less certain, according to my opinion, is the fact that Wiedemann's *Trypeta picta* and the *Tephritis conica* of Fabricius's *Systema Antliatorum* are synonyms. What Wiedemann says about the feet of his *Trypeta picta* clearly proves that he had examined the type in Fabricius's collection; moreover, Fabricius's description contains nothing to render this identification of *Tephritis conica* doubtful. In the preface to his first volume, Wiedemann gives a large number of synonymic and systematic emendations, the result of the examination of Fabricius's collection, undertaken by him; among them we find the statement that *Tephritis conica* and *Dictya picta* are the same species. But as *Dictya picta* of the *Systema Antliatorum* is nothing else but the *Musca picta* of the *Entomologia Systematica*, the synonymy of *Musca picta* F. with *Trypeta picta* Wied. and the above described *Camptoneura picta* seems to be sufficiently established. The correctness of this view seems confirmed by the fact, that *Musca picta* F. was described from a North American specimen, and that hitherto, besides *Camptoneura picta*, which has a wide range and is a common species, no other North American species is known which might come in conflict with it.

### Gen. III. DIACRITA GERST.

*Charact.*—*Body* rather robust. Pubescence everywhere very short; thorax with some bristles upon the posterior and lateral margins only.

*Antennæ* of medium length; the oval third joint longer than the only moderately sized second joint. The face, retreating above between the rather short antennal foveæ, and obtusely carinate; below, it is again projecting and convex.

*Palpi* rather large, mentum swollen.

*Wings* narrow and long, the first longitudinal vein bristly at its end only; the third and fourth longitudinal veins converging towards the end; posterior angle of the anal cell drawn out in a very long point.

This genus contains brown or brownish-yellow species, rather opaque on account of the pollen which covers them; the thorax is usually spotted with black; the wings, on the anterior margin and the apex, have a broad black border.

**1. *D. costalis* GERST.** ♂.—(Tab. VIII, f. 14.) Fusca, polline cinereo aspersa, thoracis maculis nigris ante suturam sex, pone suturam duabus, binisque minutissimis utrinque adjectis.

Almost chocolate-brown, with a grayish pollen; thoracic dorsum with six black spots before the suture and with two beyond it, to which are added on each side two very small dots. Long. corp. 0.32; long. al. 0.37.

SYN. *Diacrita costalis* GERST. Stett. Ent. Zeitschr. xxi, p. 197. Tab. II.

Almost chocolate-brown, covered with a whitish-gray pollen and opaque. Head dark-yellow, the upper part of the occiput generally brownish-yellow; the broad front, in the vicinity of the ocelli and in front of these, more reddish-yellow; on both sides, near the orbit, there is a rather large, shallow impression, covered with white pollen; on the anterior end of the front there is a small triangular spot, covered with snow-white pollen. Immediately below each of these spots, upon the face, there is a velvet-black round spot, contiguous with the orbit, and immediately below the latter a spot covered with snow-white pollen. The upper part of the face, which is carinate and retreating, has, on each side, a transverse spot, clothed with white pollen. In the same way, the posterior orbit of the eyes has a pollinose white border, which also extends over the cheeks in the shape of a stripe. The antennæ are almost ochre-yellow, their third joint elongated-oval; the basal joint of the arista is so short as to be almost imperceptible; the second joint is comparatively long, both dark ochre-yellow; the third joint is blackish, with the exception of its extreme basis; in the vicinity of the basis, it is as stout as the first two joints, more attenuated afterwards, and clothed with an extremely short pubescence. The humeral callosities are brownish-yellow, and rather shining; thoracic dorsum marked with moderately large, rounded-oval, brownish-black spots; before the region of the transverse suture there are six of them, arranged in two regular transverse rows; beyond this region there are two approximated spots, the interval of which is equal to that between the spots of the first two rows; moreover, behind the region of the suture, on each side, may be noticed two very small, almost punctiform dots, placed one behind the other; of these, the anterior one is situated before, the posterior one at an equal distance behind the last two of the larger spots. The coloring of the convex scutellum, which is beset with four, not very long bristles, approaches the chestnut-red. The feet are concolorous with the remainder of the body; an admixture of yellow is perceptible on the first joint of the tarsi only. Halteres whitish-



yellow. Wings comparatively long and narrow, of a very equal breadth, in the middle only a little broader than at the basis and at the apex; stigma strikingly long; the third longitudinal vein gently curved backwards towards the tip, and hence, the submarginal cell very much expanded towards its end; the crossveins very distant from each other; the fourth longitudinal vein, towards its end, gently bent forward, and hence, the first posterior cell narrowed towards its end; the posterior angle of the anal cell is drawn out in a narrow lobe, which is considerably longer than the cell itself. The surface of the wing is bright, shining, hyaline, upon its posterior half only with a weak trace of a grayish-brown tinge. The design on the wing consists of a broad, black, or blackish-brown border of the costal margin and of the apex; the posterior limit of this border runs, at the basis of the wing, along the fifth longitudinal vein; at the basis of the discal cell, it suddenly turns towards the fourth longitudinal vein, and, after running alongside of it for a short distance, it turns suddenly towards the third longitudinal vein, alongside of which it runs as far as a little beyond the small crossvein, here, just opposite the end of the first longitudinal vein, it abruptly turns towards the second longitudinal vein, leaves open a small segment of a circle just above it, returns towards the second vein, follows it for some distance, and, abruptly turning again, crosses the submarginal and first posterior cells, turning towards the apex in the vicinity of the fourth vein, alongside of which it reaches the margin. This border is perceptibly broader at the tip than along the anterior margin, and can therefore also be described as a large spot, entirely confluent with the border along the anterior margin. Inside of the dark anterior border, there are three small, almost hyaline spots; the first lies at the end of the second basal cell, the second, almost cuneiform, is in the marginal cell, before the origin of the third longitudinal vein, the third at the extreme tip of the costal cell; in the marginal cell, beyond the end of the first longitudinal vein, between the small hyaline spot in the shape of a segment of a circle and the costa, there is a spot, tinged with yellowish-brown; the broad black border along the apex is sometimes a little diluted in its middle.

*Hab.* Mexico (German).

*Observation.*—In the register of the second part of Wiedemann's *Aussereur. Zweifl. Insecten*, there is a *Platystoma costalis*,

which is not described in the work itself. Wiedemann's collection proves that this species is identical with the present one.

**2. *D. semula* n. sp.** ♀.—(Tab. VIII, f. 15.) Lutea, thoracis dorso fusco, maculis nigris ante suturam quatuor, pone suturam nullis.

Clay-yellow, dorsum of the thorax brown, with four brown spots before the transverse suture and none beyond it. Long. corp. 0.25; cum terebrâ 0.36; long. al. 0.31.

Very like the preceding in all plastic characters. Almost more ochre-yellow than clay-yellow, the thoracic dorsum alone strongly infuscated. The front, as in *D. costalis*, has on each side, near the orbit, a shallow impression, clothed with white pollen; below it is a round, velvet-black spot, and immediately below the latter again a spot of snow-white pollen, only the black spot is smaller than in the preceding species; also the two snow-white transverse spots on the upper part of the face are apparent, as in *D. costalis*. On the thoracic dorsum there are not six, but only four rounded oval velvet-black spots before the transverse suture, which correspond to the outward ones of the preceding species; there is no trace of black spots on the other side of the suture. The scutellum is convex and has four bristles; the large first segment of the flattened ovipositor is brownish-yellow, long, only moderately attenuated towards its end. Feet of the same coloring with the remainder of the body; the tarsi only moderately infuscated towards their end. Halteres whitish-yellow. Wings of the same shape as in *D. costalis*, only less long, especially their second half less elongate, so that the small crossvein is somewhat nearer the tip of the wing than in *D. costalis*, and that the last section of the longitudinal veins, ending in the apex of the wing, is shorter; otherwise the venation almost entirely agrees with that of *D. costalis*. The surface of the wing is hyaline; its posterior half strongly tinged with a smoky-brownish. The brownish-black design resembles that of the preceding species, differs, however, from it by the dark border along the apex being much narrower; the posterior limit of the border along the costa is also similar to that in the preceding species, but not quite identical; especially where, in *D. costalis*, this limit crosses the second longitudinal vein and leaves on the other side a hyaline segment of a circle; instead of the latter there is here only an indistinct paler dot and between this and the costa no spot of a paler coloring; the three

hyaline dots, contained within the black border of the costa, are much less clear in the present species, especially the first and the third among them.

*Hab.* California (Agassiz).

Gen. IV. **IDANA** nov. gen.

*Charact.*—*Body* robust. Hairs very short everywhere; thorax with bristles on its posterior and lateral borders only.

*Antennæ* of medium size; third joint oval, but little longer than the rather large second joint. Face obtusely carinate between the very long antennal foveæ.

*Palpi* of moderate size; the mentum moderately turgid.

*Wings* narrow and very long; first longitudinal vein towards its end provided with bristles to a considerable extent; third and fourth longitudinal veins converging towards their end; anal cell not drawn out in the shape of a lobe.

This genus contains conspicuous pollinose species; their thorax is marked with distinct black stripes and the abdomen banded with black, the design of the wings not unlike the genus *Pteropæcila*, while the general shape of the body reminds of the true species of *Ortalis*.

1. ***I. marginata*** Say. ♀.—(Tab. VIII, f. 16.) Alæ colore fusconigro et luteo pulchre variegatæ, imâ cellulæ marginalis basi, trionte apicali cellulæ basalis primæ, cellulisque posterioribus duabus primis præter venarum limbos pure hyalinis, angulo postico et cellulâ posteriore tertiâ fere totâ cinereo-hyalinis.

The wings with a handsome brownish-black and brownish-yellow picture; the extreme basis of the marginal cell, the last third of the first basal cell, as well as the first two posterior cells, pure hyaline, with the exception of the borders of the veins, inclosing them; the posterior angle and the greater part of the third posterior cell grayish hyaline. Long. corp. 0.34; cum terebrâ 0.45; long. al. 0.46 lin.

*SYN.* *Ortalis marginata* SAY, Journ. Acad. Phila. VI, p. 183, 2.

Head reddish-yellow. Front orange-yellow, opaque, with the exception of the immediate proximity of the ocelli and of the two little callosities, descending from the vertex and bearing the frontal bristles; the sides more orange-red, usually infuscated above the antennæ; on each side a rather narrow border of yellowish pollen. Antennæ of medium length; the first two joints of the coloring of the head; the second rather large; the third almost orange-yellow, of an oval shape, and but little longer than

the second; arista of medium length, with a short, but distinct pubescence. The vertical diameter of the eyes more than twice the length of the horizontal one. Face with very deep and long antennal foveæ, which run down in a perpendicular direction; their bottom is tinged with brownish-black. The face, between the foveæ, is strongly, the lower part sharply carinate, and that in such a manner that in profile the face runs down perpendicularly and in a straight line. Cheeks broad; at the lower corner of the eye with an infuscated spot. Oral opening rather large, somewhat drawn up above, so that the strongly developed, although transversely narrow, clypeus, projects a great deal beyond the peristomium. The reddish-yellow palpi rather large, broader towards the end; the brown proboscis of medium stoutness and the reddish-yellow chin only moderately swollen. The whole occiput is strongly and evenly convex. Thorax comparatively stout, but not strongly convex, distinctly narrowed anteriorly. Thoracic dorsum with a very dense, almost ochre-yellow dust, and with well-defined black longitudinal stripes; lateral border, and usually also the anterior one, chestnut-brownish or more chestnut-red; the intermediate stripe, running at an equal breadth from the anterior to the posterior border, is divided in two halves by a stripe-shaped intermediate line, which is of the same breadth with both halves of the intermediate stripe itself; the lateral stripes, which are but very little abbreviated anteriorly and posteriorly, are crossed by the yellowish-pollinose transverse suture; their posterior part moreover has alongside of it a black longitudinal stripe, which is not distinctly separated from the anterior part of the lateral stripe. Pleuræ chestnut-brownish, about their middle with a broad longitudinal stripe, which is clothed with pale ochre-yellowish pollen and gradually disappears posteriorly. Scutellum brownish-yellow. Abdomen black, but little shining, more or less chestnut-reddish at the extreme basis and on the sides of the first two segments; the second and each of the following segments have a crossband, of a dingy ochre-yellow, very thickly laid dust, occupying almost the whole of their anterior half, and narrowed on each side. The first segment of the ovipositor is black, flat, broad, nevertheless strongly attenuated towards its end. Feet brownish-yellow, tarsi strongly, but gradually infuscated towards the end. Halteres yellowish. The wings strikingly elongated, of a comparatively small and rather

equal breadth; stigma rather long but not broad; the crossveins far distant from each other; the posterior crossvein rather oblique, its anterior end nearer the apex of the wing than the posterior end; fourth longitudinal vein strongly bent forward towards the end; the first posterior cell considerably narrowed in consequence towards the apex; posterior angle of the anal cell pointed, but not drawn out in the shape of a lobe. The picture of the wings consists, as to color, of brownish-black and brownish-yellow and some hyaline cells of a peculiar shape. The root of the wings is yellow, as far as the origin of the third longitudinal vein; the extreme basis, however, is strongly infuscated; there is a rather dark-brown crossband in the region of the humeral crossvein, and the basis of the marginal cell is hyaline. A dark-brown color follows next, the first portion of which forms a curved crossband, reaching backwards as far as the posterior basal crossvein; anteriorly it is prolonged in the marginal cell, as far as the end of the first longitudinal vein, where it stops short abruptly. After some interruption, the brownish-black color forms a broad border of the anterior margin, beginning somewhat above the posterior crossvein, which does not only occupy the whole breadth of the marginal cell, but also encroaches on the submarginal cell, follows the apex of the wing and the fourth longitudinal vein as far as the small crossvein and also covers the latter; posteriorly, it not only runs along the posterior crossvein and extends over the end of the discal cell, but follows also some distance along the end of the fifth longitudinal vein, upon its posterior side; the third longitudinal vein is bordered with brownish-black upon its whole length. The portions of the marginal, submarginal and discal cells, free from the brownish-black color, are tinged with brownish-yellow; the first basal cell, as well as the first two posterior cells, are hyaline. The alula, as well as the anal angle of the wing and the adjoining portion of the third posterior cell, is grayish-hyaline, with a tinge of yellow; the posterior side of the fifth longitudinal vein has a brownish-yellow border, the middle of the third posterior cell is rather pure hyaline, only more grayish towards the posterior margin of the wing.

*Hab.* Virginia, Pennsylvania (Osten-Sacken).

*Fourth Section: ORTALINA.*Gen. I. **AUTOMOLA** gen. nov.

*Charact.*—*Front* broad, very much narrowed anteriorly. Eyes rather large, slightly protruding, irregularly rounded. Face in profile somewhat concave, obtusely carinate between the distinct antennal foveæ. The anterior edge of the mouth very much drawn upwards, so that the rather strongly developed clypeus projects considerably beyond it. Cheeks broad.

*Antennæ* reaching beyond the middle of the face; the first two joints short; the narrow third joint more than twice as long as the first two taken together, rounded at the end; antennal arista thin, slightly stronger at the basis only, with a very short pubescence.

*Thoracic dorsum* not bristly on its middle, before the region of the transverse suture. The tibiæ, before the end of their upper side, with a præapical bristle.

*The first longitudinal vein* bristly before its end; the auxiliary vein very much approximated to it; the costa more or less incrassated beyond the end of the first longitudinal vein; the third and fourth longitudinal veins parallel towards their end; the crossveins not approximated; the second basal cell and the anal cell comparatively rather small, the latter rounded at the end; the sixth longitudinal vein complete, but remarkably short, and hence, the anal angle of the wing very small; alula comparatively large.

The genus *Automola* contains unmetallic species. The picture of their wings generally consists in black spots upon the root of the wings and three black crossbands, the first of which is only at a short distance from the basis, while the second runs over the posterior crossvein and the third lies between the second and the apex of the wing; these bands being more or less incomplete, or the second and third expanding or even coalescing into one large spot, give rise to different modifications of the design of the wings.

*Ortalis atomaria* Wied. and *trifasciata* Wied. from Brazil, may be considered as the types of the genus. North American species have not been discovered yet.

I have already had occasion to mention in the Introduction that *Automola*, on account of the præapical bristles on the tibiæ, which distinguish it from the other genera, is not very well placed in the family of *Ortalidæ*.

Gen. II. **TETANOPS** FALL.

*Charact.*—*Front* of a considerable and uniform breadth. Eyes rounded-oval, or oval. Face strongly projecting in profile, more or less retreating below. Clypeus small, but projecting beyond the edge of the mouth. Oral opening comparatively small; proboscis but little incrassated.

*The hairs* and bristles on the body remarkably short, especially the bristles of the prothorax much smaller than in any other genus among the *Ortalina*; thoracic dorsum upon its middle only posteriorly with a few bristles.

*Antennæ* short, sometimes strikingly short; third joint oval, longer than the second.

*First longitudinal vein* bristly towards its end only; the crossveins rather distant; the second and third longitudinal veins parallel towards their end, or only gently convergent; posterior angle of the anal cell pointed, but not prolonged in the shape of a lobe.

The North American species of *Tetanops* are distinguished from the European ones by the more distinct and sharper anterior edge of the mouth, while in the latter the anterior end of the oral opening hardly shows a distinct margin. As one of the American species, known to me, has, moreover, the vertical diameter of the eyes considerably larger than the European species, I was for some time in doubt, whether it would not be better to separate generically the North American from the European species. Nevertheless, they possess enough characters in common, to render such a separation, at least for the present, unnecessary. Besides the stout head, with the very broad front, the striking bareness of the whole body and the great shortness of the prothoracic bristle, the absence of any picture on the wings, except some very faint spots along the costa, easily distinguishes the species of *Tetanops*.

**1. *T. luridipennis*** n. sp. ♂ ♀.—(Tab. VIII, f. 17.) Frons præter vittam medianam punctata; alæ sordide lutescentes, ad costam obsoletissime lurido-maculatæ.

Front, with the exception of a median stripe, punctate; wings of a dingy clay-yellow, with very indistinct brownish-clay-yellow spots along the costa. Long. corp. ♂, 0.21; ♀ cum terebrâ 0.28—0.32; long. al. 0.18.

Head reddish-yellow. The very broad front more red; it has a small median stripe, which is not pollinose, and has, on each side, a brown border; the latter sometimes becomes indistinct

above, and, on the anterior part of the front, is somewhat turned sideways, generally also more expanded and darker. The sides of the front, each of which is nearly double the breadth of the median stripe, are covered with white pollen, rendered cribose by a dense punctation of pollenless dots, so that of the pollinose surface, nothing but a network is left. The face, in profile, projects very much in front of the eyes, and retreats very considerably below; its intermediate portion is, as in all the species of *Tetanops*, comparatively narrow. The antennal foveæ are deep and sharply defined, shining-black, except on their upper portion. Eyes rounded-oval; cheeks very broad. The upper part of the occiput is clothed with white pollen; in the vicinity of the orbits and of the edge of the vertex this pollen is likewise interrupted by punctiform pollenless dots. Antennæ yellowish-red, the third joint, with the exception of the basal third, more or less infuscated. Although the ground color of the thorax is shining-black or brownish-black, it is, with the exception of the humeri, concealed by a thick grayish-white pollen, sometimes yellowish on the thoracic dorsum; numerous punctiform, pollenless dots interrupt this pollen and give it a cribose appearance; the region of the prothoracic spiracle alone is free from these dots. The pollen covering the scutellum is similar in coloring to that of the thorax, but it is, to a considerable extent, much less thick upon its sides. The abdomen has the same color and the same pollinose surface, interrupted by punctiform, pollenless dots, as the thorax, but the pollen is a little less thick and the punctiform dots a little larger, so that, here and there, they coalesce and the ground color becomes more apparent. The first segment of the flattened ovipositor is shining black, very broad, rather strongly attenuated, however, towards its end. Femora blackish-brown, the tip of the front ones yellowish-red to a small, the tip of the hindmost ones to a greater extent. Front tibiæ blackish-brown, with a yellowish-red basis; middle tibiæ usually entirely yellowish-red or but little infuscated towards their end; hind tibiæ blackish brown, with a yellowish-red basis and generally also the extreme tip of the same color. Tarsi yellowish-red at the basis, the front ones from about the tip of the first joint, the posterior ones from about the tip of the second or third joint, blackish-brown. Wings of a dingy clay-yellow, almost brownish in fully colored specimens, without any distinct picture; however,



indistinct traces of three somewhat darker clouds are apparent; the first in the marginal cell, above the origin of the submarginal cell, the second at the end of the stigma, and the third, which sometimes is wanting, fills up the end of the marginal cell; all three are so little apparent that they can easily be overlooked.

*Hab.* Nebraska (Dr. Hayden).

**2. *T. integra* n. sp.** ♀.—(Tab. VIII, f. 18.) *Frons tota punctata; alae cineræ, immaculatæ.*

The whole front is punctate; wings gray, without any picture. Long. corp. cum terebrâ 0.28—0.31; long. al. 0.17.

Head brownish-black, rather dusky brownish-red upon the greater part of the front, the cheeks, and near the anterior edge of the mouth. The front has no median stripe, and is altogether covered with grayish-white pollen, rendered cribose by numerous small and very dense pollenless dots; a fine network, covering the whole front, is all that remains pollinose. The pollen extends, from the front over the very broad lateral portions of the face, as far as the cheeks; the pollenless dots, however, do not reach beyond the middle of the face. The face in profile is less projecting in front of the eyes, and less retreating below, than in *T. luridipennis*. The antennal foræ, on their outside slope, are covered, to a considerable extent, by a white pollen; at the bottom they are shining black. The flattened ridge of the carina, separating them, has also a whitish pollen. The vertical diameter of the eyes is larger than in the preceding species or in any of the species of *Tetanops* to me known. The cheeks are very broad, although somewhat narrower than in *T. luridipennis*. The upper half of the occiput is clothed with a whitish pollen, extending upon the hind side of the cheeks as far as the edge of the mouth; in the vicinity of the posterior orbit and of the edge of the mouth, this pollen is interrupted by pollenless punctiform dots. Antennæ brownish-red, the third joint for the most part blackish-brown. The ground color of the thorax is glossy, almost shining-black, but altogether covered by a whitish-gray or more yellowish-gray pollen, interrupted by countless dots, which are, however, much smaller and less sharply defined than in the preceding species. Quite in front, the thoracic dorsum shows an indistinct beginning of a median stripe, in the shape of two dark longitudinal lines, which are rather distant from each other.

Upon the pleuræ the pollen is perceptibly less dense than upon the thoracic dorsum, so that they appear shining. Upon the sides of the scutellum the pollen is thick and not interrupted, while that upon its disk somewhat resembles the pollen on the surface of the thoracic dorsum, only it is a little thinner and has no distinct pollenless dots. The abdomen is shining black, covered, towards the basis, with a gradually increasing, uninterrupted, but not very thick ash-gray pollen. The first joint of the flattened ovipositor is shining black, very broad, but little narrowed towards its end, with somewhat convex sides and comparatively shorter than that of *T. luridipennis*. Feet black or brownish-black; the extreme tip of the femora, the basis and extreme tip of the tibiæ, as well as the tarsi, yellowish-red; however, the last three or four joints of the fore tarsi and the last two joints of the hind tarsi, brownish-black. Wings rather hyaline, gray, with a delicate tinge of brownish-clay-yellow, without any picture.

*Hab.* Illinois (Osten-Sacken).

### Gen. III. **TEPHRONOTA** Loew.

*Charact.*—*Head* high and short. Front of a moderate and equal breadth, comparatively long. Face rather sharply carinate, only little protruding in front of the eyes in profile; almost vertical. The vertical diameter of the eyes almost double the size of the horizontal one. Anterior edge of the mouth not drawn upwards. Cheeks very narrow.

*Antennæ* of a medium length; the first two joints short; the third ending at a sharp angle, although not excised above.

*Thorax* upon its middle with bristles on the hind part only; covered with a gray dust.

*The first longitudinal vein* with bristles upon its end only; the end of the fourth longitudinal vein not curved forward; the posterior angle of the anal cell, although sharp, is not extended in the shape of a lobe.

This genus contains only small-sized species, which, in their whole organization, approach the species of *Pteropaectria*; this is still more the case with the European species, than with the only American one which I know. The latter, however, agrees in so many characters with the European *Tephronotæ*, that it can be placed, without any hesitation, in that genus. Its antennæ are a little shorter and their third joint somewhat broader; the

pollen on the body is thicker and more extended than in the European species; the crossbands of its wings are incomplete.

**1. *T. humilis* Loew.** ♂ ♀.—(Tab. VIII, f. 24.) *Nigricans, cinereo-pollinosa, capite flavo, pedibus luteis, alae albido-hyalinae, fasciis tribus nigris, intermediâ integrâ, reliquis postice abbreviatis.*

Rather black, covered with gray pollen; with a yellow head, and rather clay-yellow feet; wings whitish-hyaline, with three black crossbands, the median of which is entire; the two others are abbreviated. Long. corp. ♂ 0.12—0.14; cum terebrâ 0.11—0.16; long. al. 0.1—0.13.

**Syn. *Herina ruficeps* v. d. Wulp,** Tijdschrift voor Entomol., Jaarg. IX, p. 156.

Head yellow. Front brighter yellow, almost orange-red upon its anterior end; on each side with a conspicuous border of white pollen, which, becoming broader, extends below over the face as far as the cheeks. The occiput becomes blackish above, but is rather evenly covered with a rather thick whitish pollen. The ground color of the thorax is rather black, more brownish on the humeri and upon the lateral border, as well as below the root of the wings; this color, in well-preserved specimens, is covered by a grayish-white pollen; upon the thoracic dorsum there are two longitudinal stripes, of a somewhat darker color, very little apparent and abbreviated posteriorly. The color of the scutellum, which is likewise covered with gray pollen, verges more on dingy brownish, and on clay-yellow along the edges; in less fully colored specimens the whole scutellum is clay-yellow. The color of the abdomen is likewise rather black, sometimes only brown at the basis. In the male, this color appears distinctly as black or brownish-black upon the last segment and on the hypopygium, both of which are pollenless, while on the preceding segments this color is concealed under a rather thick pollen, which on the anterior portion of the segment has a light whitish-gray, on the posterior half a brown coloring. The female has the last abdominal segment likewise pollinose, the pollen being generally light white-grayish, or verging on brownish about the middle of the abdomen only; the pollen on the preceding segments is the same as in the male. The first segment of the altogether flattened ovipositor is not very long, but very broad and very broadly truncate at its end; its pollen is very little perceptible, so that it is glossy-black, more brownish-black in

immature specimens. Feet of a dirty clay-yellow, femora in the middle and tarsi towards the tip, somewhat infuscated. Halteres whitish-yellow. Wings whitish-hyaline, with three broad, perpendicular, more grayish-black than black crossbands. The first of these bands covers, near the anterior margin, the latter half of the costal cell, and reaches, without becoming more narrow, the fourth or fifth longitudinal vein; in the first case it becomes perceptibly paler between the third and fourth, in the second case between the fourth and fifth longitudinal veins. The second band covers, near the anterior margin, the apical half of the stigma and reaches there, in most specimens, even a little beyond the end of the first longitudinal vein; without attenuating, it runs over the small crossveins as far as the fourth longitudinal vein, forms a very broad border along the section of the fourth vein lying between the two crossveins, and runs, afterwards, along the posterior crossvein towards the fifth longitudinal vein; its breadth is not the same in all specimens; when narrower, this crossband shows a distinct knee-shaped bend, depending upon its passage from the small to the posterior crossvein (this is the case with the specimen figured by Mr. v. d. Wulp); when broader, this crossband extends, in the shape of a blackish-gray shadow, as far as the third posterior cell, so that of the knee-shaped bend only a trace is left, which is due to a diluted spot upon the inner side of the crossband, near the posterior margin of the discal cell (as represented in my figure). The third band covers, on the anterior margin, the end of the marginal cell to a considerable extent, becomes gradually more narrow posteriorly and reaches more or less completely the fourth longitudinal vein, where it suddenly is interrupted. The root of the wing is tinged with blackish-gray as far as a little beyond the humeral crossvein. The second and third longitudinal veins are strongly divergent towards their end; the last section of the fourth longitudinal vein slightly converges towards the third vein and is not quite so straight as usual in the species of *Tephronota*, but, at the same time, not so much curved forward by far as in the case of the species of *Anacampta*, *Holodasia*, and *Apospasmica*. The crossveins are very much approximated, as the distance between them is not much larger than the length of the small crossvein, but smaller than the posterior crossvein. The posterior angle of the anal cell is short and sharp, and not prolonged in the shape of a lobe. The sixth

longitudinal vein is weak and indistinct soon after its middle, so that it appears interrupted a long distance before the margin of the wing.

*Hab.* New York (Osten-Sacken); Virginia; Texas (Belfrage).

*Observation.*—The description of *Herina ruficeps* by v. d. Wulp, contains only one datum which might render its identification with *T. humilis* doubtful. He says that the third antennal joint is four times as long as the second, while in all my specimens it hardly reaches three times its length. As, in other respects, the agreement of the very good description is perfect, I have not the slightest doubt that this difference arises from a different mode of viewing or measuring the antennæ. Unfortunately, the name given by Mr. v. d. Wulp cannot be preserved, as it has been preoccupied by Fabricius.

#### Gen. IV. CEROXYS Macq.

*Charact.*—*Head* rather rounded. Front very broad, somewhat narrowed above, without stripe. The perpendicular diameter of the eyes is much larger than the horizontal one. Cheeks of medium breadth.

*Third antennal joint* upon its upper side distinctly excised, very much pointed at the tip. Arista distinctly pubescent.

*Thorax*, upon its middle, with bristles as far as its anterior portion.

*First longitudinal vein* with bristles upon its end only; the fourth longitudinal vein not curved forward. The posterior angle of the anal cell acute, but not prolonged in the shape of a lobe.

The genus *Ceroxys* contains species which are very much alike; the thorax and abdomen are thickly covered with yellowish or grayish dust; the head is yellow. The picture of the wings, consisting of comparatively large blackish-brown or black spots, is the same in all the species; it consists of seven spots, the first of which lies on the basis of the submarginal cell, the second upon the end of the stigmatal (third costal) cell; the third covers the small and the fourth the posterior crossvein; the last three spots lie on the ends of the second, third, and fourth longitudinal veins; the last two generally coalesce completely, while the one placed at the end of the second vein is generally less completely united with them.

The species are easily distinguished by the shape and color of the third antennal joint, by the presence or absence of a dark crossband on the posterior margin of the abdominal segments, by

the greater or smaller extent of the spots on the wings, especially by the relative position of the stigmatal spot to the one covering the small crossvein, and by the separation or coalescence of both.

**1. *C. obscuricornis* n. sp.** ♂ ♀.—(Tab. VIII, f. 20.) Polline ex cinereo lutescente vestitus, tertio antennarum articulo fusco-nigro, pedibus luteis, alarum maculâ stigmatali et limbo venæ transversalis mediæ fasciolam arcuatam efficientibus.

Covered with a grayish-clay-yellow pollen; third antennal joint brownish-black, feet clay-yellow; the spot at the end of the stigmatal cell and the one covering the small crossvein form a curved crossband. Long. corp. ♂ 0.21; ♀ cum terebrâ 0.25; long. al. 0.2—0.21.

The first two antennal joints brownish-ferruginous-yellow, or brownish-yellow; third joint brownish-black, of medium breadth; arista black. Scutellum upon its edge only indistinctly yellowish-brown. Abdomen without any trace of dark crossbands, except that the pollen, towards the posterior portion of the segments, becomes more brownish-gray in a hardly perceptible degree. The first joint of the flattened ovipositor is only moderately long, very broad; its truncature very broad also; the coloring and the pollen are the same as those of the abdomen. Feet clay-yellow; tarsi, with the exception of the basis, more or less strongly infuscated; the only male in my possession has the front femora very much infuscated upon the greater part of the posterior side; it is not probable, however, that this is a constant sexual character. The first spot on the wings extends from the first to a little beyond the fourth vein; the spot lying upon the end of the stigmatal cell is more or less completely coalescent with the one covering the small crossvein, and forms with it a rather oblique, distinctly arcuated crossband; the other spots have nothing peculiar about them.

*Hab.* Nebraska (Dr. Hayden).

**2. *C. ochricornis* n. sp.** ♀.—(Tab. VIII, f. 21.) Polline ex cinereo lutescente vestitus, segmentis abdominalibus postice anguste fuscolimbatis, antennis ex-ferrugineo ochraceis, pedibus luteis, alarum maculâ stigmatali et limbo venæ transversalis mediæ in fasciolam rectam conjunctis.

Covered with a grayish-clay-colored pollen; the segments of the abdomen with narrow brown borders posteriorly; antennæ ochre-brownish, the

feet clay-yellow; the spot upon the end of the stigmatal cell and the one covering the small crossvein, in coalescing, form a straight crossband. Long. corp. cum terebrâ 0.25; long. al. 0.21.

Antennæ altogether ochre-brownish; third joint distinctly broader than in *C. obscuricornis*; arista brownish-black. Scutellum generally yellowish, with the exception of its middle. Abdominal segments, with the exception of the last one, with very narrow, but very sharply limited and conspicuous brown posterior margins. The first segment of the very flattened ovipositor is only moderately long, very broad, and very broadly truncate at the end; its coloring and its pollen are similar to those of the abdomen. Feet clay-yellow; tarsi strongly infuscated, generally paler towards the basis. The first spot upon the wings reaches from the first to the fourth longitudinal vein; the spot upon the end of the stigmatal cell is more or less completely connected with the spot covering the small crossvein, forming a straight, almost perpendicular half-crossband; the other spots have the ordinary appearance.

*Hab.* Northern Wisconsin River (Kennicott).

**3. *C. similis* n. sp. ♀.**—(Tab. VIII, f. 23.) Polline lutescente vestitus, segmentis abdominalibus postice nigro-limbatis, alarum maculâ subbasali in fasciam dilatata, maculâ stigmaticali et limbo venæ transversalis mediæ in fasciolam conjunctis.

Covered with clay-yellow pollen; the abdominal segments margined with black posteriorly; the spot near the basis of the wing is extended in the shape of a crossband; the one at the end of the stigmatal cell forms a half-crossband with the spot covering the small crossvein. Long. corp. ♂ 0.22; ♀ cum terebrâ 0.27—0.28, long. al. 0.21—0.22.

First two antennal joints yellow; the third joint is unfortunately lost in all the three specimens which I have before me, but is probably of the same color. Scutellum yellow, or grayish upon its middle only. The segments of the abdomen have all, without exception, a brownish-black, narrow, well-defined border, upon their posterior side. The first segment of the flattened ovipositor is only moderately long, very broad, very broadly truncate at the end; its coloring and the pollen upon it, are of the same color as on the abdomen. Feet clay-yellow; tarsi, especially towards their tip, rather strongly infuscated. The first spot on the wings expands into a crossband, reaching anteriorly as far as the costa,

posteriorly it extends, although somewhat paler, along the sixth longitudinal vein, which it finally crosses, as far as the posterior margin of the wing, on the fifth longitudinal vein it forms an obtuse angle, at which place, on the sides of the fifth longitudinal vein, it is very faint, sometimes almost interrupted; the spot at the end of the stigmal cell coalesces with the one covering the small crossvein, forming a steep, somewhat curved half-cross-band; the spot covering the posterior crossvein is rather large; the three other spots are of the usual shape.

*Hab.* Connecticut (Osten-Sacken).

*Observation.*—The name which I give to this species is intended to call to mind its extraordinary resemblance to *C. crassipennis* Fab., occurring in Europe. This resemblance is so great, that I would doubt the specific distinctness of the two species, if the femora of the American one were not altogether yellow, while those of *C. crassipennis* are blackish-brown from the basis as far as the middle. In order to overlook this difference and to maintain the identity of the two species, the proof of a perfect agreement in all, even the minutest, plastical characters would be required. The three specimens of *C. similis* in my possession are not well preserved enough to enable me to undertake such a comparison.

**4. *C. canus* Loew.** ♂ ♀.—(Tab. VIII, f. 22.) Polline ex lutescente cinereo vel albido-cinereo vestitus, tertio antennarum articulo pedibusque fasciis, alarum maculâ stigmaticali et limbo venæ transversalis mediæ separatis.

Covered with a yellowish-gray or grayish-white pollen; third joint of the antennæ and the feet brown; the spot on the stigmal cell entirely separated from the one which covers the small crossvein. Long. corp. ♂ 0.16; ♀ ovm terebrâ 0.23; long. al. 0.16—0.18.

*SYN. Ortalis cana* Loew, Berl. Entom. Zeitschr. II, p. 374.

Smaller than the preceding species, with a grayish or whitish-gray pollen, verging less on yellow. The first two antennal joints brownish-yellow or yellowish-brown; the third joint of medium breadth and rather blackish-brown. Antennal arista black. The scutellum at most indistinctly yellowish-brown along the edges only. Abdominal segments without any trace of darker borders. The first joint of the flattened ovipositor distinctly longer than in the three previous species and somewhat less broadly truncate at



the end; its coloring and the pollen upon it are the same as those on the abdomen. Coxæ and feet blackish-brown; the second coxal joint, the tip of the femur, the basis of the tibiæ and the extreme tip of the middle tibiæ are yellowish-red. In the European specimens this yellowish-red coloring has often a much greater extent and also occurs at the basis of the tarsi; it is probable that the same is the case with some American specimens. The surface of the wings is much more whitish than in the other species; the first spot is small, although it reaches from the first to the fourth vein; the spot at the end of the stigmatal cell is also comparatively small, does not quite reach the second longitudinal vein, and remains quite separated from the spot covering the small crossvein; the spot covering the posterior crossvein is of a moderate breadth; the spots upon the ends of the longitudinal veins are of the ordinary size.

*Hab.* Yukon River, Alaska (Kennicott); Nebraska (Dr. Hayden).

*Observation.*—Of this species I possess only a male from Nebraska and a female from Hudson's Bay Territory. The most careful comparison with specimens of *Ceroxys canus* from the southern part of middle Europe and from southern Europe has not revealed any character indicative of a specific distinctness of the European and the American specimens.

#### Gen. V. ANACAMPTA Loew.

*Charact.*—*Head* hemispherical, rather than round; front broad, somewhat narrower above; the vertical diameter of the eye much larger than the horizontal one; cheeks broad.

*Third antennal joint* distinctly out upon its upper side; pointed at the end.

*Thorax* upon its middle provided with bristles near the posterior margin only.

*First longitudinal vein* with bristles upon its end only; the end of the fourth longitudinal vein curved forward in a striking manner; posterior angle of the anal cell sharp, but not prolonged in the shape of a lobe.

The genus *Anacampta* contains species of large size, which resemble *Ceroxys* in their general appearance, as well as in the picture of the wings. They differ, however, sufficiently in the black color of the body, in the thoracic dorsum not being provided with bristles as far as its anterior part and in the conspicuous

curvature of the end of the fourth longitudinal vein. The black coloring of the body they have in common with the species of *Holodasia* and *Apospasmica*, which they approach in the whole structure of their body. They differ from *Holodasia* in the fact that the first longitudinal vein is not provided with bristles upon its whole course, but at its end only. From *Apospasmica* they differ in the shape of the anal cell, the posterior angle being only acute here, while in *Apospasmica* it is drawn out in a long lobe; moreover, in the latter genus, the end of the fourth longitudinal vein is not curved forward; in *Anacampta* the picture of the wings consists rather of spots, or bands consisting of spots, while in *Apospasmica* there are complete crossbands. The structure of the third antennal joint of *Anacampta* affords a character for the distinction of it from all the other genera of *Ortalina*, which renders any further developments superfluous.

1. *A. latiuscula* n. sp. ♂ ♀.—(Tab. VIII, f. 19.) Nigra, thorace abdominisque fasciis duabus cinereo-pollinosi, capite ex rufo luteo, pedibus rufis, alis nigro-maculatis.

Black, thorax and two crossbands on the abdomen covered with gray pollen; head reddish-yellow; feet red; wings spotted with black. Long. corp. ♂ 0.31, ♀ cum terebrā 0.33—0.34; long. al. 0.26.

One of the largest species of the genus, and broader in shape than most of them. Head reddish-yellow, opaque, covered with a very thin, and hence not easily perceptible greenish-white pollen; occiput more thickly pollinose with white. Front broad, somewhat narrower above; the not very distinct frontal stripe very much narrowed above, of a purer yellowish color and almost pollenless; the comparatively thick pubescence of the broad lateral portions of the front is inserted in very small, but distinct brownish dots. Antennæ ochreous-brown, the color of the first two joints more yellowish, that of the third joint more brownish. Ground color of the thorax, with the exception of the brick-red humeral callosities, black, but altogether covered with an ashy-gray pollen, which is not quite so thick on the pleuræ as on the thoracic dorsum. The hairs and bristles of the thoracic dorsum are inserted on small, but distinct black dots. Scutellum black, with a broad brick-red border, pollinose with ashy-gray. Abdomen shining-black, with black hairs and two broad crossbands of whitish-gray pollen, situate on the anterior portion of the

second and third segments; they gradually become indistinct on the sides and finally disappear near the lateral margin. The fifth segment of the female abdomen is very much shortened. The first joint of the ovipositor is shining-black, with black hairs, about as long as the penultimate segment of the abdomen, not very broad, and, towards its end, rather narrowed. Feet brick-red; tarsi infuscated towards their end, the front ones much more than the four posterior ones; the front tibiæ also show sometimes a browner coloring. Wings grayish-hyaline, quite gray towards the posterior border, not very transparent; more yellow towards the basis, especially in the costal cell; stigma ochre-yellow, with a somewhat infuscated end. The picture of the wings is brownish-black; it comprises: 1, a spot upon the humeral crossvein, reaching as far as the fourth longitudinal vein; 2, a perpendicular crossband, covering the end of the costal cell near the anterior border, and reaching posteriorly as far as the sixth longitudinal vein; between the fifth and the sixth longitudinal veins it is much paler and disappears gradually in the gray coloring of the surface of the wing; 3, a perpendicular half-crossband, beginning near the anterior margin, immediately beyond the end of the first longitudinal vein, running over the small crossvein and reaching a little beyond its posterior end; 4, a spot, broadly covering the posterior crossvein in the shape of a half-crossband; 5, a spot occupying the end of the marginal cell and, with the end nearer to the root of the wing, reaching into the submarginal almost in the shape of a hook, without touching the third vein; 6, a spot near the apex of the wing, the limit of which runs almost perpendicularly from the end of the second longitudinal vein to the fourth longitudinal, beyond which it occupies only a small space at the extreme end of the second posterior cell.

*Hab.* California (Alex. Agassiz).

Gen. VI. **AOSPASMICA** nov. gen.

*Charact.*—Front of equal breadth. Face rather strongly carinate; rather perpendicular and straight in profile; the vertical diameter of the eyes very much larger than the horizontal one.

*Third antennal joint*, on its upper side, gently but distinctly excised, very pointed at the end; arista very bare.

*Thorax* along the middle with bristles on its hind part only.

*First longitudinal vein* with bristles towards its end only; the end of the fourth longitudinal vein not curved forward; the posterior angle of the anal cell drawn out in a narrow, exceedingly long lobe.

Robust, black species, of the same general appearance as *Holodasia* and *Anacampta*; the structure of the head more like that of *Pteropaectria*; the thorax generally shows longitudinal lines of a paler-colored dust, answering to the intervals of the ordinary thoracic stripes. The wings have complete crossbands.

The typical species is the *Ortalis fasciata* of Wiedemann, from Chile, which is identical with the *Tephritis quinquefasciata* Macq. Dipt. Exot. Suppl. IV, 291.

The shape of the anal cell reminds very much of *Diacrila*; nevertheless, there are no other points of relationship between the two genera.

*Observation.*—Should an American species be found which does not well fit in any of the above-described six genera, the characters of the European genera should be compared; they have been given in the part treating of the systematic distribution of the *Ortalidæ* in general.

#### *Fifth Section: PTEROCALLINA.*

##### Gen. I. **PTEROCALLA** Rond.

*Charact.*—*General appearance:* Trypeta-like.

*Wings* very narrow, in comparison to their length, of a rather striking shape on account of their equal breadth, very broadly rounded at the root and at the tip; auxiliary vein much shorter than the first longitudinal vein, so that the distance between the ends of both is strikingly large; first basal and discal cells very long; posterior crossvein very oblique, its anterior end being much nearer the apex of the wing than its posterior end; the posterior angle of the anal cell drawn out in a moderately long lobe.

The peculiarities in the outline of the wings and in the venation of the species belonging to this genus are so striking, that no doubt can possibly arise about the location of any of them. In some other respects, these species differ considerably from each other, so that, should their number increase, it would be necessary to break up the genus *Pterocalla* into smaller genera. The name *Pterocalla* would, in this case, remain to the genus which contains *P. ocellata* Fab., as Mr. Rondani established the genus for this species.

1. *P. strigula* n. sp. ♂.—(Tab. VIII, f. 30.) Albido-pollinosa, punctis maculisque deformibus fusco-nigris aspersa; alæ fusco-nigræ, disco dilutius fusco, punctis maculisque fusco-nigris variegato, marginibus antico macularum hyalinarum serie, postico limbo latiusculo hyalino ornatis, venis longitudinalibus non undulatis.

Clothed with white pollen, marked with brownish-black dots and irregular spots; wings brownish-black, of a paler brown upon their middle, and with brownish-black spots and dots; the anterior margin with a row of hyaline spots and the posterior margin with a rather broad hyaline border; longitudinal veins not undulated. Long. corp. 0.12—0.13 Long. al. 0.17—0.18.

In the structure of the head and of its parts, the coloring and picture of the whole body, this species resembles *Myennis vau* very much, but it differs considerably in the narrow wings with almost parallel sides, with a different venation and a different picture. The ground color of the body is an opaque brownish-black, for the most part covered with a thick white dust; the latter's surface on the upper side is broken through by brownish-black dots and a number of rather regularly arranged, but very irregularly shaped, brownish-black spots; the face does not show any such broken through places; the upper, larger half of the pleuræ shows numerous brownish-black dots, which almost coalesce above into a stripe; a little below the middle of the pleuræ there is a brownish-black longitudinal stripe and immediately below it a narrower stripe, formed by a white pollen; the pectus is brownish-black. Femora and tibiæ brownish-black (the intermediate femora in the described specimen are paler perhaps in consequence of immaturity); all the femora have, upon their last third, a more or less complete ring of white pollen; their extreme tip, as well as the basis of the tibiæ, are tinged with yellowish-white; each tibia shows, upon its middle, a very conspicuous white ring and a very sharply limited white tip. The yellowish-white feet are somewhat infuscated towards the end. Wings strikingly long and narrow, of an unusually equal breadth; very obtuse at the end, like in other species of *Pterocalla*; the auxiliary vein is remarkably short, so that the distance between its end and the end of the first longitudinal vein is remarkably large; the second longitudinal vein is rather long; the third ends not far from the apex of the wing, and has, like the others, a very straight and not at all undulated course; the ends of the third and fourth veins hardly show a vestige of convergency; the crossveins are rather

closely approximated; the posterior crossvein, with its anterior end, is nearer to the apex than with its posterior end; the posterior angle of the anal cell is drawn out in a very long and pointed lobe (the figure makes it too short and heavy). The extended and entirely uninterrupted picture of the wings leaves near the anterior margin an irregular row of hyaline spots and on the posterior margin a broader hyaline border, with an irregularly undulated outline; the coloring of the picture is brownish-black; its inner part is paler brown, with numerous brownish-black dots and spots.

*Hab.* Georgia (Berlin Museum).

Gen. II. **STICTOCEPHALA** nov. gen.

*Charact.*—*General appearance:* Trypeta-like.

*Front* very broad, with punctures; cheeks comparatively broad; clypeus somewhat projecting over the edge of the mouth.

*Wings* of the usual shape; the ends of the auxiliary and of the first longitudinal veins are far distant from each other; posterior crossvein steep; posterior angle of the anal cell acute; the third and fourth longitudinal veins, towards their end, at least with a trace of a convergency.

All the species belonging here are opaque in their coloring; thorax and abdomen are punctate in all of them; moreover, they are generally marked with other pictures.

The species which I know of may be separated in two groups, on account of the different size of the hairs on the front. *Stictocephala cribrum* and *cribellum*, would belong to the first group, *S. corticalis* and *vau* to the second. In the two latter species, the two uppermost of the short hairs, inserted on the lateral border of the front, assume the appearance of bristles, so that in this respect these species are like the *Trypetina*, while this is not the case with the two preceding species.

**1. *S. cribellum*** n. sp. ♂ ♀.—(Tab. VIII, f. 26.) Cinerea, frontis parte antica, antennis, facie, genis, proboscide, palpis pedibusque luteis; alæ hyalinæ, fasciis quatuor, præter secundam, postice abbreviatis, maculâ apicali et venæ transversalis posterioris limbo fuscis.

Gray; the anterior part of the front, antennæ, face, cheeks, proboscis, palpi, and feet clay-yellow. Wings hyaline, with four bands, which are abbreviated posteriorly, except the second; a spot at the apex and a border along the posterior crossvein, brown. Long. corp. 0.13—0.15; long. al. 0.14—0.15.

Light gray, front somewhat yellowish towards its anterior margin, covered with rather coarse punctures; the uppermost hairs near the lateral margin of the front are not longer and stronger than usual. Antennæ clay-yellow, third joint rounded-ovate, sometimes rather brownish-yellow. Ground color of face and cheeks clay-yellowish, covered with a whitish pollen. Proboscis and palpi clay-yellowish. Thoracic dorsum with somewhat scattered blackish-brown dots, which sometimes coalesce in lines upon its posterior portion; moreover with four brownish-black spots in a row corresponding to the transverse suture. Scutellum with four bristles, turgid, pale-gray, with two conspicuously large shining-black spots at the end. Metathorax black, pruinose with whitish-gray. Pleuræ dotted with brownish-black above. Abdomen with similar dots, usually with a more clay-yellow ground color at the basis; this color is sometimes more extended and gives the abdomen a more yellowish-gray tinge, while the thorax is whitish-gray. Coxæ and feet clay-yellow; posterior coxæ at the basis and the tarsi towards their tip, somewhat infuscated. Wings hyaline with four perpendicular, not very dark, brown bands, a broad brown border on the posterior crossvein and a brown apex; the first band begins near the anterior margin immediately beyond the humeral crossvein, and is not distinctly perceptible beyond the sixth longitudinal vein; the anal cell is just filled out by it; the second band begins at the anterior margin quite near the end of the auxiliary vein, and ends upon the end of the sixth longitudinal vein; the third band begins immediately before the end of the first longitudinal vein and runs across the small crossvein, at the end of which it is interrupted; the fourth band generally reaches from the anterior margin not quite as far as the third longitudinal vein, or is continued a little beyond it in the shape of a faint shadow.

*Hab.* Nebraska (Dr. Hayden).

**2. *S. cribrum* n. sp.** ♀.—(Tab. VIII, f. 25.) Præcedenti similima, sed major, alarum ploturâ simili, sed saturatiore, fasciâ tertiâ et venâ transversalis posterioris limbo in fasciam integram confluentibus, tibarum omnium apice, posticarumque annulo medio, apice denique tarsorum nigris.

Very like the preceding, but larger; the same picture of the wings, but darker; the third band and the infuscation along the posterior crossvein

coalesce into an incomplete crossband. The tip of all the tibiæ, a ring on the middle of the hind ones and the tip of all the tarsi, black. Long. corp. 0.21; long. al. 0.20.

Unfortunately, I possess only a single, badly preserved specimen of this insect. The resemblance to the preceding species is so great, that only the observation of the living insect or the comparison of a large number of specimens, will enable one ultimately to decide about their specific diversity. The considerably larger size, the darker coloring of the picture of the wings, the coalescence of the third crossband of the wings with the infuscation on the posterior crossvein into a complete band, the difference in the coloring of the feet (in *S. cribellum* the tibiæ show only a weak trace of a darker coloring at the tips, and there is no trace whatever of a ring on the hind tibiæ, the tarsi are but slightly infuscated towards the end)—all these differences render a specific distinctness probable, although, on the other hand, the great resemblance of all the other characters tends to diminish this probability.

*Hab.* Middle States (Osten-Sacken).

*Observation.*—In case the specific identity of *S. cribellum* and *cribrum* is proved, the latter name should be retained for the species, as representing the more fully colored, and hence, normal specimens, while *S. cribellum* would then be regarded as a smaller and paler variety.

**3. *S. corticalis* Fitch in litt.** ♂ ♀.—(Tab. VIII, f. 28.) Fusco-nigra, polline albo-cinereo aspersa, punctis, maculisque fusco-nigris variegata; alæ albido-hyalinæ, venis omnibus, maculisque numerosis nigris.

Brownish-black, covered with a whitish-gray pollen and with brownish-black spots and dots; wings whitish-hyaline, with black veins and numerous black spots. Long. corp. ♂ 0.15; ♀, 0.19. Long. al. 0.17.

The ground color of the body is an opaque brownish-black. Head of the same coloring, only the front, towards its anterior margin, seems to have a more or less reddish-brown or brownish-red ground color; the pollen on the whole head is whitish-gray; on the extreme lateral margin of the front it is more dense and almost white; upon the middle of the front and at a considerable distance from its sides, there are two oval, oblique, opaque, brownish-black spots; a spot of the same coloring surrounds the ocelli, and has, upon each side a smaller spot, upon which the



inner vertical bristle is inserted. The two superior hairs upon the sides of the front are prolonged and incrassated to the size of distinct bristles; above the two spots upon its middle, the front has no hairs, besides these bristles; below the spots, however, the front is beset with erect black hairs, inserted upon hardly perceptible dark dots. Antennæ ferruginous-brown, more distinctly ferruginous on their inner side towards the basis; the third joint round, black towards the end. Arista slightly incrassated at the basis and blackish-brown upon the incrassation, then pale yellowish and again darker towards the end. Thorax covered with a white-grayish pollen and with a brownish-black punctation and picture; the latter consists of ten regularly arranged spots upon its disk, and of a longitudinal stripe on each side, which begins at the anterior end and reaches up to the root of the wings; the picture of the pleuræ consists of two irregular longitudinal stripes; the pectus is neither punctate nor pictured, and the pollen upon it is not equally distinct when viewed from different sides. The rather turgid scutellum has a brownish-black picture, the whitish-gray pollen remaining visible on the lateral corners and at the end only. The abdomen agrees with the thorax in its coloring and has, besides the punctation, a regular and elegant brownish-black picture, which is more fully developed in the female than in the male; it consists of two small, approximated longitudinal stripes in the middle of the abdomen, which begin at the posterior end of the second segment and end at the posterior end of the fourth segment; on both sides of these stripes, between them and the lateral margin, there is a row of conspicuous spots, placed near the anterior margin of the segments and not reaching the posterior one. The first segment of the ovipositor is very broad and broadly truncate at the end; brownish-black, like the rest of the body; its basis is marked with two very large brownish-black spots, reaching as far as the middle and which have only a narrow stripe between them; the latter, as well as the posterior half are covered with a thin, whitish-gray pollen, and punctate with brownish-black. Feet brownish-black; knees, a rather broad ring upon the middle of the tibiæ and basis of the tarsi yellowish. Halteres blackish-brown, the stem, with the exception of its basis, of a dirty whitish. Wings hyaline, viewed obliquely strikingly whitish; all the veins black upon their whole extent. The picture consists of rather numerous black spots,

which seem to be rather constant in their position, but less constant in their extent; the figure is drawn from a female specimen, which has them less extended; usually, the inside of these spots is distinctly paler, but this varies in different specimens; very characteristic is the part of the picture surrounding the small crossvein, which does not seem to be subjected to any important variation.

*Hab.* New York (A. Fitch).

*Observation.*—The described specimens, a male and a female, were obtained by Baron Osten-Sacken from Dr. Fitch under the name of *Trypeta corticalis*.

4. *S. vau* SAY. ♀.—(Tab. VIII, f. 29.) Fusco-nigra, polline albinereo aspersa, punctis maculisque fusco-nigris variegata; alæ hyalinæ, maculis octo nigris, quatuor costalibus, unicâ apicali, unicâ margini postico contiguâ reliquis majore et venam transversalem posteriorem includente, duabus denique minoribus venæ longitudinali sextæ appositis; præterea macula ovata lutescens permagna, a maculâ costali secundâ usque ad secundam venæ sextæ maculam pertinens conspicitur et macula costæ tertiæ eodem colore luteo cum maculâ marginis postici conjungitur, ita ut fascia integra, in mediâ alâ multo dilutior, appareat.

Brownish-black, powdered with whitish-gray, marked with brownish-black dots and spots; wings hyaline, with eight black spots, four on the costa, one at the apex, one, larger than the others, near the posterior margin, covering the posterior crossvein, two smaller spots upon the sixth longitudinal vein; besides, there is a very large ovate, brownish-yellow spot, extending from the second spot on the anterior margin to the second of the two smaller spots on the sixth longitudinal vein; the third spot on the anterior margin is connected by the same coloring with the spot upon the posterior crossvein, thus forming a complete crossband, which is much paler in the middle of the wing. Long. corp. 0.16—0.19; cum terebrâ 0.18—0.24; long. al. 0.14—0.18.

*Syn.* *Ortalis vau* SAY, Journ. Acad. Phil. VI, 184, 4.

Ground color opaque brownish-black. Head of the same color, but the anterior portion of the front and the face of a reddish-brown or dirty brick-red coloring, which sometimes also extends to the middle line of the front. The two superior hairs upon the lateral margin of the front are bristle-like. The front, from the anterior margin nearly as far as the ocelli, is clothed with black hairs, inserted upon impressed punctures; there is no definite picture upon it. The thorax is covered with a white pollen and punctate with brownish-black. The picture on the thoracic

dorsum consists of ten small spots, the inner ones among which are sometimes dissolved into dots, and moreover, on each side, of a row of spots, almost coalescent into an irregular longitudinal stripe, closely approximated to the exterior margin; upon the pleuræ there are two irregular longitudinal stripes; the pectus itself is brownish-black without any paler pollen or paler picture. Abdomen with a whitish-gray pollen, with brownish-black dots and with four longitudinal rows of brownish-black spots, placed upon the anterior portion of the segments; between them, upon the middle of the third and fourth segments, there are two still smaller spots upon the posterior portion of these segments. The first segment of the ovipositor is brownish-black, opaque, without any whitish-gray pollen and without picture. Feet brownish-black, sometimes only dark-brown in not fully colored specimens; knees, a ring in the middle of the tibiæ and the tarsi clay-yellow; usually the last three joints of the front tarsi and the last two on the posterior tarsi, are more or less infuscated. Halteres yellowish-white. Wings hyaline, rather whitish when viewed obliquely, their picture consisting partly of a black, partly of a clay-yellow or brownish-yellow coloring; there are four deep-black spots upon the costa; the first is composed of the incrassated humeral crossvein, and a short line, immediately beyond it, between the costa and the auxiliary vein, so that it has the shape of a fork, or almost of a ring; below the humeral crossvein, as well as below the small arcuate crossband, there are small black dots (one under each); the second deep-black spot on the anterior margin lies in the costal cell, but little beyond the end of the small basal cells; it is circular; between it and the third spot on the anterior margin, there is a small deep-black dot, placed at the end of the auxiliary vein; the third, likewise deep-black spot on the anterior margin, lies on the end of the subcostal cell and reaches the second longitudinal vein; the fourth spot on the anterior margin lies before the end of the marginal cell; inside of this cell it is deep-black, but turns beyond it into brown and further into yellowish-brown; it ends in the middle between the third and fourth longitudinal veins, thus assuming the shape of a perpendicular crossband, which is broader at its anterior end. At the apex of the wing there is another black spot, which begins immediately beyond the termination of the second longitudinal vein and extends but little beyond the end of the fourth longitu-

dinal vein. The posterior crossvein is covered by a brownish-black spot, which is especially expanded near the posterior margin and the anterior end of which is connected by an ochre-yellowish or somewhat brownish-yellow coloring with the third spot of the anterior margin, thus forming a complete crossband, somewhat expanded posteriorly and tinged with yellowish in the middle. Sometimes, however, the brown spot upon the posterior crossvein is somewhat more isolated from the yellowish coloring and extends in the direction of the half-crossband, formed by the fourth spot on the anterior margin. This less common variety is the one described by Say, l. c.; the ordinary picture is represented on Tab. VIII, f. 29, of the present volume. On the anterior side of the sixth longitudinal vein there are two black spots of only moderate size and rounded shape. Of them, the second only crosses that vein, gradually to fade away. Between the second costal spot and the second of the two spots of the sixth vein, there is a very large oval ochre-yellowish or more brownish-ochreous spot; it reaches on one side as far as the posterior basal cell, and assumes within the marginal cell a rather dark-brown coloring. The veins of the wing are black or brownish-black inside of the picture, clay-yellow elsewhere. The third and fourth longitudinal veins converge towards their end a little more than in the preceding species.

*Hab.* United States.

*Observation.*—I possess six female specimens and no male, but have seen the latter in other collections. It does not show any perceptible difference from the female, except in the sexual marks.

Gen. III. **CALLOPISTRIA** nov. gen.

*Charact.*—*General appearance* almost *Trypeta*-like.

*Front* exceedingly broad, with impressed punctures; cheeks comparatively broad; clypeus somewhat projecting over the edge of the mouth, sometimes withdrawn inside of the oral opening.

*Wings* with an unusually convex posterior margin; posterior crossvein very oblique, its anterior end much more approximated to the apex of the wing, than the posterior end; the posterior angle of the anal cell is drawn out in a very long, acute lobe.

The species upon which this genus is based, cannot well be placed in the genus *Stictocephala* on account of the remarkable difference in the outline of the wings as well as in the venation.

In other respects this species agrees with the preceding genus in the structure of the body; with *S. corticalis* and *vau* it even agrees in the coloring and the picture of the body, as well as in the bristle-like nature of the upper hairs on the sides of the front.

**1. *C. annulipes* Macq.** ♂ ♀.—(Tab. VIII, f. 27.) *Fusco-nigra, albido-pollinosa, et punctis maculisque fusco-nigris variegata, tibiis tarsisque pallide lutescentibus, illis nigro-triannulatis, his apicem versus infuscatis; alæ hyalinæ, maculis punctisque nigris confertim aspersæ.*

Brownish-black, with a whitish pollen, pictured with brownish-black spots and dots; tibiæ and tarsi pale-yellowish, the former with three black rings, the latter brown towards their end. Wings hyaline, densely covered with black spots and dots. Long. corp. ♂ 0.14—0.15; ♀ 0.17; long. al. 0.16—0.18.

SYN. *Platystoma annulipes* MACQUART, Dipt. Exot. Suppl. V, p. 121.

The ground color of the body is brownish-black and opaque; the pollen, covering it, is whitish-gray. Head of the same color, covered everywhere with brownish-black spots, moreover, dotted with brownish-black upon the front and the cheeks; upon the posterior orbit especially there is a conspicuous short row of brownish-black spots. Front very broad, perceptibly narrower anteriorly, where it is yellowish or yellowish-red. Eyes rather strongly projecting. Antennæ brown, the first two joints and the larger part of the inner side of the third joint yellowish-brown, sometimes much paler. Thoracic dorsum with brownish-black dots, which coalesce into ill-defined, although regularly arranged, spots. Scutellum somewhat swollen, with four bristles, two brownish-black longitudinal stripes and two blackish-brown dots, upon which the lateral bristles are inserted. Pleuræ likewise with brownish-black dots and spots; the latter form two irregular and incomplete longitudinal stripes. Pectus brownish-black, with a brown, but little perceptible, pollen. Abdomen with brownish-black dots and regularly arranged spots; the first segment of the ovipositor is for the most part covered with a whitish-gray pollen and punctate with brownish-black. Femora brownish-black, with a more or less distinct, broad, irregular ring, covered with gray pollen, and with black dots; the tip is pale-yellowish. Tibiæ pale-yellowish with three regular brownish-black rings; the first near the basis, the last before the apex; tarsi of the same color as the tibiæ, infuscated towards the tip. Halteres pale-yellowish.

Wings of an unusual shape, on account of the great convexity of the posterior margin, hyaline, with black veins and numerous, partly only punctiform, partly rather large black spots of an irregular shape; the punctiform dots prevail in the middle, while the borders of the wing are principally occupied by larger spots, among which those along the posterior margin do not entirely reach the latter. The peculiarities of the venation are indicated above, among the generic characters.

*Hab.* United States; very common.

*Observation.*—I do not entertain the slightest doubt that Macquart's *Platystoma annulipes* is the above-described species. His description agrees perfectly well, with the exception of the words: "face blanche, une petite tache ronde d'un noir luisant de chaque côté." All my specimens have, on the sides of the face, or rather on the cheeks, nothing but brownish-black, opaque, irregular spots.

#### Gen. IV. **MYENNIS** R. Desv.

*Charact.*—*General appearance:* Trypeta-like.

*Third antennal joint* oval; cheeks broad, clypeus small, projecting over the edge of the mouth.

*Wings* narrow in comparison to their length, a little more attenuated towards the apex; the first longitudinal vein beset with bristles upon the portion only, which forms the limit of the very long stigma; before this spot the first longitudinal vein appears almost bare, the pubescence being very short and delicate; the two posterior basal cells are comparatively large; the posterior angle of the anal cell is pointed; the posterior end of both crossveins is nearer the apex of the wing than their anterior end, so that their position is a very oblique one.

The genus *Myennis* was established by Rob. Desvoidy for *Scatophaga fasciata* Fab. As *Trypeta scutellaris* Wied. agrees with that species in the above-enumerated characters, we can, for the present, unhesitatingly refer it to *Myennis*. The peculiarity, however, of the *Pterocallina*, of showing considerable plastic differences almost from species to species, appears again in the two above-named species. In *P. scutellaris* Wied. the eyes are less round, the cheeks broader, the scutellum less swollen, the crossveins less approximated, the longitudinal veins, instead of straight, somewhat undulated, and the third and fourth longitudinal veins, towards their end, not distinctly convergent, but parallel.

1. *M. scutellaris* Wied. ♂ ♀.—Cinerea, antennis flavis, pedibus ex fusco testaceis, thoracis margine laterali atro-maculato, scutello tumido; alæ angustæ, hyalinæ, fasciâ basali, fasciis duabus discoidalibus antice connatis, plagâque apicali ex nigro fuscis pictæ, præterea in cellulis marginali et submarginali maculis aliquot fuscis variegatæ.

Var. ♂ fasciâ discoidali secundâ inter venas transversales late interruptâ.

Cinereous, with yellow antennæ and brownish-yellow feet; the lateral margin of the thorax with black spots; the scutellum swollen; the narrow wings are hyaline; a small crossband at the basis, two crossbands, connected anteriorly, upon the middle of the wing and a large spot upon the apex, brownish-black; moreover several brown spots in the marginal and submarginal cells.

Var. ♂ the second of the two bands upon the middle of the wing, is broadly interrupted in the middle.

Long. corp. 0.17—0.18; long. al. 0.17—0.18.

SYN. *Trypeta scutellaris* WIEDEMANN, Auss. Zweifl. II, p. 484.

*Trypeta? scutellaris* LOEW, Monogr. of N. A. Dipt. I, p. 92. Tab. II, f. 26, 27.

Very like a *Trypeta* in its general appearance. Head comparatively high. The under side of the occiput rather tumid. Front yellow, of a medium breadth, long, its anterior margin rather projecting. Face somewhat retreating, a little excavated, infuscated inferiorly, covered with a pale-colored dust; antennal foveæ hardly indicated. Eyes oval. Cheeks brown, very broad. Proboscis not perceptibly incrassated. Palpi short, but broad, of a dusky reddish-yellow; clypeus small and narrow. Antennæ ochre-yellow; the third joint oval, altogether rounded at the end; arista rather long and bare; it is thin at the end, but gradually stouter towards the basis. The upper part of the thorax dark-gray from a thick dust; the ground color of the humeri more or less ferruginous-yellow. Upon the lateral border of the thorax there is an irregular row of, for the most part contiguous, black spots; the largest among them is near the posterior corner; one is higher upon the upper part of the thorax than the others and near the transverse suture. The hairs and bristles are also placed upon very small, and but little perceptible, black dots. Scutellum with four bristles, rather turgid, of a shining dark-brown, with a clay-yellow median stripe; sometimes the clay-yellow color is more extended. Pleuræ blackish-brown, the posterior part yellowish-brown. Abdomen of the male cinereous; the penultimate segment shining-black, more thickly dusted towards the posterior

margin, and hence gray and opaque; the last segment is similar to the penultimate, only the dust on the posterior margin is less extended. The female has a blackish-gray abdomen (its coloring, however, seems to have been unnaturally modified in the four specimens which I had for examination); at the basis of the last three segments a darker coloring is perceptible, but it is not shining. The flattened, broad, yellowish-brown ovipositor is but very little attenuated towards its end. Feet brownish-yellow, the front femora at the basis, the four posterior ones near the apex, brown. The more maturely colored male has the greater part of the femora dark-brown, the first half of the tibiae and a faded ring upon the middle of their second half, yellowish-brown. Wings comparatively long and narrow; the first longitudinal vein reaches far beyond the middle of the anterior margin and is beset with bristles along the side of the very long stigma only; the longitudinal veins have a very irregular undulated course; both crossveins have their anterior end nearer to the root of the wing, than the posterior end; their position is consequently a distinctly oblique one and both are slightly bisinuated; the third longitudinal vein is not beset with bristles. Both small basal cells are rather large in size; the posterior angle of the anal cell is strongly pointed; the third and fourth longitudinal veins are parallel towards their end. The stigma is brownish-black; a brownish-black picture is contiguous to it, which has almost the shape of an inverted V; it is formed by two crossbands which are coalescent in front; the first is broader and runs from the basis of the stigma over the basis of the discal and of the third posterior cells rather perpendicularly, almost reaching the posterior margin of the wing, while the narrower second band takes an oblique course over both crossveins, as far as the posterior margin; a short, but rather broad brownish-black crossband runs from the humeral crossvein as far as the basis of the anal cell; upon the apex there is a very large blackish-brown spot, beginning at the end of the marginal cell and extending to the tip of the second posterior cell; in the submarginal cell, between this large spot and the preceding crossband, there is a brownish-black spot of a considerable size, which, however, is very variable in different specimens; the portion of the marginal cell situated between the stigma and the apical spot has blackish-brown, brownish and almost hyaline spots; a small spot of a much darker



tinge lies near the anterior side of the second longitudinal vein, below the point of the stigma. The picture of the wings seems to be rather variable, the end of the exterior costal cell being sometimes blackish-brown, sometimes hyaline; the other dark spots are sometimes faded upon their middle, sometimes also less extended. In a male in the Berlin Museum, the only specimen of that sex which I have seen, the crossband covering both crossveins is broadly interrupted between them (compare the figure in *Monographs, etc.*, Vol. I, Tab. II, f. 26). At first, I supposed this difference to be a sexual one, but I doubt this now, since I have had an opportunity of ascertaining the great inconstancy of the picture of the wings of the female.

*Hab.* Mexico.

*Observation.*—The figures given in the *Monographs, etc.*, Vol. I, Tab. II, f. 26, 27, are sufficiently correct as far as the picture of the wing is concerned, but the outline of the wing is not well rendered; they are represented as too broad in proportion to their length.

## SECOND DIVISION.

### ORTALIDÆ HAVING THE FIRST LONGITUDINAL VEIN BARE.

#### *First Section: ULIDINA.*

#### GEN. I. DASYMETOPA Loew.

*Charact.*—*Front* broad, narrower anteriorly, abundantly hairy on the whole surface, the hairs on its sides not longer.

*Antennæ* rather short, third joint elongated-oval, with a thin, bare arista.

*Face* not excavated, descending vertically; *clypeus* projecting over the border of the mouth; *opening of the mouth* not large; *proboscis* but little thickened.

*Thorax* bristly on its hind part only; *scutellum* with a rather even surface and with four bristles.

*Wings* broader than those of the related genera; stigma of a very conspicuous size; posterior crossvein oblique, its anterior end being much nearer the apex of the wing than the posterior; the last section of the fourth longitudinal vein is strongly bent forward; the posterior angle of the anal cell is drawn out in a point.

The general appearance of the species of this genus is very much like that of *Trypeta*; the coloring of the species at present

known is not metallic. The peculiar venation distinguishes these species from all the others of the present group. The typical species is *D. lutulenta* Loew (Berl. Entom. Zeitschr. XI, 285; Tab. II, fig. 1), from Surinam.

No *Dasymetopæ* from North America are as yet known.

Gen. II. **OEDOPA** Loew.

*Charact.*—Head conspicuously large; front unusually broad; ocelli on the edge of the vertex, very closely approximated.

*Antennæ* very short and very distant from each other; third joint rounded, with a thin, bare arista; frontal fissure running in an almost straight line from antenna to antenna; no frontal lunule.

*Face* broad, somewhat convex, with a small excavation under each antenna; its lateral portions conspicuously broad, distinctly separated from the middle portion.

*Eyes* rather round, but somewhat broader than high, comparatively small, hardly reaching the middle of the height of the head; hence, the cheeks unusually broad.

*Clypeus* not horseshoe-shaped and thus surrounding the proboscis, but lobiform, connate with the anterior edge of the comparatively small oral opening; *proboscis* small.

*Thorax* with bristles on its hind part only; *scutellum* flat, with four bristles.

*Wings*: the last section of the fourth longitudinal vein, towards its tip, is somewhat curved forward and thus convergent towards the third vein; posterior crossvein curved in the shape of an S; posterior angle of the anal cell drawn out in an elongated point.

The body appears very bare on account of the sparseness and shortness of the hairs, as well as of the shortness of the bristles. The structure of the head resembles somewhat that of some South Asiatic *Ortalidæ*, while similar American forms have, before now, not been known.

**1. O. capito** Loew. ♂ ♀.—(Tab. IX, f. 1-3.) Albicans, fasciâ frontis tenui, thoracisque vittis nigris, in supero faciei margine maculis atris tribus, lateralibus ovatis, mediâ didymâ.

Whitish; front with a black transverse band, thorax with black longitudinal stripes; the upper margin of the face with three deep black spots; the lateral ones oval, the middle one double. Long. corp. 0.18—0.25; long. al. 0.15—0.22.

**Syn.** *Oedopa capito* Loew, Berl. Ent. Zeitschr. XI, p. 287, Tab. II, f. 2.

Head yellowish-white, only the middle of the occiput somewhat blackish; the ocelli are placed upon a punctiform black dot; the

very broad front has, somewhat below its middle, a narrow, gently curved, blackish crossband, above which the single, rather sparse hairs are inserted in small, somewhat darker colored pits; this is not the case below the crossband; no stripes run from the vertex down along the orbits of the eyes. Antennæ yellow, the place of insertion of the arista infuscated or blackened; between the eye and the antenna there is, on each side, a transversely-oval, velvet-black spot; between the antennæ and next to the frontal fissure is another velvet-black transverse spot; which consists of two small semi-oval transverse dots. The face, including the clypeus and the very broad cheeks, is more whitish than the front; the cheeks with a very delicate, easily rubbed off, whitish down. Eyes during life with two narrow crossbands, which are sometimes perceptible even in dry specimens. Palpi yellow, with delicate, pale hairs. Thorax and scutellum whitish-yellow; the dorsum of the thorax with six parallel, blackish longitudinal stripes; the two intermediate ones extend also over the flat scutellum. Pleuræ with three blackish longitudinal stripes, the upper one of which occupies the border between the dorsum and the pleura; quite downwards, moreover, there is a stripe-shaped black spot, which, however, seems to be produced by the rubbing off of the dust on the upper part of the pectus. Abdomen flat and rather narrow, whitish in consequence of the very dense dust which covers it; the ground color, however, is blackish, except the posterior part of the last segment in the female; the short, black hairs are inserted on small black dots, which are so closely approximated in the vicinity of the lateral border that they appear confluent, as irregular longitudinal spots; the last segment of the abdomen of the male is very much elongated; the first segment of the female ovipositor is attenuated towards its end, otherwise it looks like the remainder of the abdomen; its punctuation, however, is much closer and finer; its adaptation to the abdomen is so close, that it might easily be taken for the last abdominal segment, especially when, as often happens, the black second and the yellowish third joint of the ovipositor are altogether withdrawn into it. Feet yellowish with whitish dust; the posterior femora generally with a blackish spot, on the under side before the tip; all the tibiæ with two black rings, the upper one of which is narrower and usually interrupted on the upper side of the tibia; fore tarsi blackened beyond the

tip of the first joint; the other tarsi blackened to a smaller extent. Halteres yellowish-white. Wings rather hyaline, of a dirty whitish tinge; the second and the next following longitudinal veins, as well as the crossveins which connect them, are black; the other veins yellowish; stigma small, of the same coloring as the rest of the wing; the picture of the wing consists of five brown spots with somewhat paler nuclei; three of them are in the marginal cell, near the anterior margin: the first, which like the second is oblique, is placed at the tip of the first longitudinal vein; the last is at the end of the marginal cell; beyond this is the fourth, a transverse spot in the submarginal cell, immediately under the tip of the second longitudinal vein; and again under the latter is the last spot, which is rounded and placed in the first posterior cell. The last three spots have the appearance of a narrow, very much shortened transverse band, which appearance is more distinct in those specimens, in which these spots are somewhat larger than usual. The small crossvein is beyond the middle of the discal cell, but before the tip of the first longitudinal vein.

*Hab. Nebraska* (Dr. Hayden).

Gen. III. **NOTOGRAMMA** Loew.

*Charact.*—*Front* of an equal, rather considerable breadth, scrobiculate.

*Antennæ* rather long; third joint elongated, with a thin, bare arista.

*Face* very short, the anterior edge of the mouth very much drawn upwards; *clypeus* considerably projecting over it.

*Thorax* with bristles on its hind portion only; *scutellum* flat, with sharp edges.

*Wings*: posterior angle of the anal cell drawn out in a point; second half of the last section of the fourth longitudinal vein very much bent forward; posterior crossvein perpendicular; auxiliary vein unusually short, and hence, the narrow stigma very long.

**1. *N. stigma* FAB.** ♀.—(Tab. IX, f. 5.) Nigro-chalybea, thorace lineis alternantibus nigris et læte virescentibus variegato, alarum limbo costali maculisque parvis nigris.

Blackish-steelblue, thorax with lines, showing alternately a blackish and a pale-green reflection; wings with the anterior margin bordered with black, and with small black spots. Long. corp. 0.11—0.16; long. al. 0.1.

**SYN.** *Musca stigma* FABRICIUS, Ent. Syst. Suppl. p. 563, 72.

*Musca stigma* FABRICIUS, Syst. Antl. p. 303, 96.

*Dacus obtusus* FABRICIUS, Syst. Antl. p. 278, 30.

*Ulidia stigma* WIEDEMANN, Auss. Zweifl. II, p. 565, 1.

*Notogramma cimiciformis* LOEW, Berl. Entom. Zeitschr. XI, p. 289, Tab. II, fig. 3.

Head rather disciform. Front reddish-brown, scrobiculate, remarkably hairy; the rather conspicuous stripes, descending from the vertex along the orbits of the eyes, and the elongated ocellar triangle are steel-bluish, shining; the ocelli are placed near the edge of the vertex, and are approximated to each other. The first two antennal joints brownish-black; the elongated third joint brownish-brickred, brown towards the tip. Face and clypeus metallic blackish-green, but little tinged with blue. The dorsum of the thorax has numerous black longitudinal stripes, which are separated by finer lines, having a metallic, light-green reflection and traced as if with a trembling hand. Pleuræ metallic blackish-steelblue, strongly tinged with greenish; above the fore coxæ with a large spot, covered with white pollen; from this place to the suture which runs down from the root of the wings, the pleuræ are covered with deep-black, punctiform dots, upon which single hairs are inserted. Scutellum rather large, flat, sharp-edged, metallic greenish-black, but rather dusky. Abdomen shining, blackish-steelblue; the first segment of the flattened ovipositor is of the same color, and attenuated towards its end. Feet black; tarsi brick-red, the foremost ones from the tip of the first joint, the four posterior ones from the tip of the second joint, brownish-black; the hind tibiæ somewhat compressed. Halteres dirty-yellow. Wings comparatively short, rather hyaline, with conspicuous, black veins; the costal and marginal cells have an altogether black coloring, which forms a border along the apex of the wing, extending from the tip of the marginal cell across that of the submarginal and of the first posterior cells; it becomes less intense here; in the submarginal cell, above the small crossvein, there is a black dot and farther towards the apex a small, triangular black spot; between the two again a black longitudinal line, which extends as far as the triangular spot; the picture in the first posterior cell is a similar one, only the first black dot is wanting and the two other black spots are somewhat more approximated to the apex of the wing; in the discal cell there are also two black spots, the smaller one before, the larger one beyond its middle; the second posterior cell is marked in the

middle with a punctiform black dot;<sup>1</sup> finally, in the third cell, not far beyond the fifth longitudinal vein, there are two successive punctiform blackish spots; the small crossvein is in the middle of the discal cell; the posterior crossvein is straight.

*Hab.* Cuba (Gundlach).

*Observation.*—The accurate knowledge which Wiedemann had of Fabricius's collection enables us to admit his authority as to the synonymy of *Dacus obtusus* Fab. with *Musca stigma* Fab. Wiedemann had a large number of specimens of *Musca stigma* (which he placed in the genus *Ulidia*) for comparison, and it is upon the ground of this comparison that he affirmed that the presence or absence of a pale spot upon the black border of the costa does not constitute a specific character. We can therefore safely accept the synonymy of *Musca stigma* Fab. with *Noto-gramma cimiciformis* Loew, the latter being the variety in which the pale spot is wanting.

#### Gen. IV. **EUPHARA** Loew.

*Charact.*—*Front* of an equal, moderate breadth; scrobiculate, coarsely hairy.

*Antennæ* almost more than of medium length; third joint elongated, with a thin, bare arista.

*Face* excavated; *clypeus* projecting.

*Thorax* with bristles on its hind part only; *scutellum* convex, with four bristles.

*Wings*: Posterior angle of the anal cell drawn out in a point; the last section of the fourth longitudinal vein parallel to the third; the small crossvein rather approximate to the posterior crossvein; the latter perpendicular.

The principal characters which distinguish this genus from the following one, to which it stands nearest, are the shorter and not attenuated stigma and the parallelism of the third and fourth longitudinal veins. Moreover, all the species of this genus seem to have black crossbands on the wings, while in those of the next following genus only the costal cell, the stigma, and the apex of the wing are blackened. The typical species is *Ceroxys coerulea* Macq. (Dipt. Exot. Suppl. III, p. 62, Tab. VII, f. 6), from Brazil, again described by me as *Euphara coerulea* (Berl. Ent.

<sup>1</sup> It is inadvertently omitted in the figure; the spots in the next cell likewise are but very feebly marked.

Zeitschr. XI, p. 291, Tab. II, f. 4; the figure of the wing is reproduced in the present volume, Tab. IX, f. 4).

I have not seen any North American *Eupharæ* yet.

Gen. V. **ACROSTICTA** Loew.

*Charact.*—*Front* of an equal, moderate breadth, scrobiculate, rather coarsely hairy.

*Antennæ* rather short; the third joint elongate-ovate, with a thin, bare arista.

*Face* excavated, *clypeus* projecting.

*Thorax* with bristles on its hind part only; *scutellum* convex, with four bristles.

*Wings*: posterior angle of the anal cell drawn out in a point; the last section of the fourth longitudinal vein converges towards the third longitudinal vein; posterior crossvein perpendicular; stigma narrow and very long.

The difference between this genus and the preceding has been mentioned under the head of the latter. The characters which distinguish *Acrosticta* from *Euxesta* are: the elongated shape of the third antennal joint, the front, which is marked with pits, the stouter proboscis and the very long, narrow stigma. The picture of the wings resembles that of the species of *Seoptera*, except that the somewhat turgid front of the latter shows no vestige of pits and the face is not transversely excavated, but carinate. As typical species may be considered either *A. scrobiculata* Loew (Berl. Ent. Zeitschr. XI, p. 293, Tab. II, f. 5) or *A. foveolata* Loew (ibid. p. 294), both from Brazil.

No North American species is as yet known.

Gen. VI. **SEOPTERA** Kirby.

*Charact.*—*Front* of equal breadth, somewhat elevated, with very short hairs.

*Antennæ* rather long, the broad third joint elongate-oval, with a thin, bare arista.

*Face* carinate, *clypeus* projecting.

*Thorax* with bristles on its hind part only; *scutellum* convex, with four bristles.

*Wings* comparatively long; the posterior angle of the anal cell pointed; the very long last section of the fourth longitudinal vein converges towards the third vein.

*Feet* somewhat longer and more slender than those of the related genera.

Kirby called this genus *Seioptera*. Following the usual rule of latinization, I modified the name to *Seoptera*. Later, Rob. Desvoidy called this genus *Myodina*; this name, however, cannot supersede the older one of Kirby, which, moreover, characterizes very well the peculiar habit of the species belonging here.

**1. *S. colon* Loew.** ♂ ♀.—(Tab. IX, f. 6.) *Nigra, nitida, fronte rufa, antennis et facie ex rufo flavis, alarum macula apicali triangulari et cellula costalis basi nigra, stigmate subfusco.*

Shining black, front red, antennae and face reddish-yellow; a triangular spot on the apex of the wing and the basis of the costal cell black; stigma brownish. Long. corp. 0.19—0.21; long. al. 0.19—0.22.

**SYN.** *Seoptera colon* Loew, Berl. Ent. Zeitschr. XI, p. 296, Tab. II, f. 6.

Of a shining black, somewhat bluish-black color; the abdomen more glossy than shining. Front of a fiery red, opaque, along the orbit of the eyes with a delicate line, powdered with white pollen. Antennae yellowish-red; the third, elongate-oval joint is rather broad. Face and clypeus brilliant reddish-yellow, the latter often, the former seldom, tinged with chestnut-brownish. On the dorsum of the thorax there are two narrow lines of whitish pollen, which extend beyond its middle; they are easily overlooked, although very distinct in well-preserved specimens. Feet black, the tips of the femora and tibiae and the basis of the hind tarsi have a reddish-brown tinge, even in specimens of the darkest coloring; in lighter specimens this coloring is brownish-brickred, and extends not only over the greater part of the tibiae and the hind tarsi, but is also perceptible at the root of the fore tarsi. Halteres pale-yellowish. Wings hyaline; costa, auxiliary vein, and first longitudinal vein black; the other veins much paler, generally yellowish when seen in a reflected light. The costal cell blackened as far as the humeral crossvein; the stigma, as well as the whole subcostal cell, at the end of which it is placed, brownish; at the apex of the wing there is a triangular black spot, which covers the extreme tip of the marginal cell as well as the tip of the submarginal cell, and crosses a little beyond the third longitudinal vein. The small crossvein is nearly under the middle of the stigma, but beyond the middle of the discal cell; the last section of the fourth longitudinal vein is particularly long, straight, gradually converging towards the third; the anal cell is



broad and has a sharp posterior angle, although it is hardly drawn out in a point.

*Hab.* New York (Osten-Sacken); Illinois (Kennicott).

*Observation 1.*—This species, as far as I know, is undescribed, although not absolutely new, because Wiedemann, as his collection shows, received it from Say under the name of *Ortalis colon*. Harris, in his Catalogue of the Insects of Massachusetts, also has *O. colon*, which is undoubtedly the same species. I preserved the name which Say gave it, although I do not find it described in his works.

*Observation 2.*—*Seoptera colon* is so exceedingly like the European *S. vibrans* Lin., that as long as I had only indifferently preserved specimens of it, I took it for the latter species. Although the differences are only slight, they are so constant that the specific distinctness of the two species cannot be called in doubt. The front of *S. colon* is somewhat broader than that of *S. vibrans*; the two whitish stripes of the thorax in *S. colon*, although but little apparent, can easily be traced beyond the middle of the dorsum, while in *S. vibrans* it is not without difficulty that their anterior end alone can be perceived. The abdomen of *S. colon* is always less shining, and its blackish color more bluish, while *S. vibrans* has it more blackish-green. The costal cell of *S. colon* is blackish as far and even a little beyond the humeral crossvein; in *S. vibrans* this cell is entirely hyaline as far as its extreme basis; the stigma of *S. colon* is brownish, that of *S. vibrans* black or brownish-black; finally the black spot at the tip of the wings is somewhat different in both species; that portion of it which crosses the third longitudinal vein is of more equal breadth in *S. colon*, whereas it becomes more narrow towards the margin of the wing in *S. vibrans*.

#### Gen. VII. EUXESTA Lowy.

*Character.*—Front of equal, medium breadth, even, rather coarsely hairy.

*Antennæ* short, the third joint almost round or rounded-oval, with a thin, bare arista.

*Face* more or less excavated, *clypeus* projecting.

*Thorax* with bristles on the hind part only; *scutellum* convex.

*Wings*: posterior angle of the anal cell drawn out in a point; the last section of the fourth longitudinal vein converges towards the third; posterior crossvein perpendicular.

The general appearance of the species belonging here is not unlike *Trypeta*. Legs short. The coloring is metallic; the black picture of the wings consists either of some large spots along the anterior margin or of crossbands. The plastic characters of the species do not afford any features for their satisfactory distribution into groups; for this reason the following three groups are merely based upon the picture of the wings.

1st Group. *Wings with spots along the anterior margin.*

**1. *E. spoliata* Loew.**—(Tab. IX, f. 7.) Viridis, capite pedibusque flavis, extremo femorum apice fusco, tibiis anticis fere totis, reliquarum apice tarsisque inde ab articuli primi apice nigris, alarum stigmate nigro, maculâ subapicali nigricante.

Green, head and feet yellow, the extreme tip of the femora brown, fore tibiæ almost entirely, the tips of the four posterior tibiæ and the tarsi, from the tip of the first joint, black; wings with a black stigma and with a blackish spot immediately before the tip. Long. corp. 0.12; long. al. 0.12—0.13.

Syn. *Euresta spoliata* Loew, Berl. Ent. Zeitschr. XI, p. 298, Tab. II, f. 7.

Metallic-green, shining; the color of the scutellum and of the anterior segments of the abdomen is somewhat more bluish-green. Head yellow; the upper part of the occiput is blackish-green; front ferruginous-yellow; the swellings descending from the vertex along the orbit of the eyes and the immediate vicinity of the ocelli is metallic greenish-blue. Antennæ of a dark ferruginous-yellow; third joint round. Face shorter than in most of the other species. Clypeus yellow, protruding considerably beyond the anterior border of the mouth, although projecting but little in profile. Feet yellow; all the femora distinctly infuscated at the extreme tip; fore tibiæ rather stout, brownish-black, before the middle with an incomplete yellow ring; the intermediate tibiæ are blackened at the extreme tip only, the hind tibiæ also at the tip, but to a greater extent; the first joint of the hind tarsi is yellow, except the tip; the following joints are black (the intermediate and hind tarsi are wanting in the described specimen). Halteres yellowish. Wings pure hyaline with pale clay-yellow veins; extreme root of wings pale yellowish; the last section of the fourth longitudinal vein is but very slightly arcuated, but converges in its whole length towards the third vein, its tip thus approaching very near this vein; stigma blackened;

immediately before the tip of the wing there is a blackish spot, which reaches from the anterior margin to the third longitudinal vein and covers the extreme end of the marginal cell; the extreme end of the submarginal cell is not covered by it. It may be that, in more fully colored individuals, this spot is darker.

*Hab.* Cuba (Riehl).

**2. *E. pusio* Loew; ♀.**—(Tab. IX, f. 8.) *Viridis vel ex chalybeo viridis, thoracis dorso albido-pollinoso, pedibus piceo-nigris, genibus, tibiæ apice tarsisque totis luteis, alarum stigmatibus et macula subapicali nigris.*

Green or bluish-green; dorsum of the thorax covered with a white pollen; feet piceous-black; knees, tips of the tibiæ and the whole of the tarsi of a dirty-yellow; wings with a black stigma and a black spot immediately before the apex. Long. corp. 0.12; long. al. 0.13.

*Syn. Euxesta pusio* Loew, Berl. Ent. Zeitschr. XI, p. 299, Tab. II, f. 8.

Metallic bluish-green; thorax and scutellum rather opaque, in consequence of a comparatively dense white pollen; abdomen shining; its first segment of a dirty-yellow towards its sides. The very broad first segment of the flattened ovipositor is almost as long as two-thirds of the abdomen. Head of a reddish-brick color; the sides of the front, the frontal lunule, the face, including the clypeus and the cheeks, are covered with a rather dense, white pollen. The black hairs on the front are not conspicuous. Antennæ brownish-ferruginous, or rusty-brown; third joint round. Face rather short, considerably excavated; clypeus but little projecting beyond the opening of the mouth. Occiput apparently altogether metallic-black, but the ground color is very much concealed by a thick whitish pollen. Feet piceous black; the second joint of the coxæ, the knees, almost the whole latter half of the tibiæ and the whole tarsi dirty-yellow or brick-red. Halteres whitish-yellow. Wings somewhat whitish hyaline, the veins pale; stigma of a blackish color, which, on its first half, extends as far as the middle of the marginal cell; immediately before the apex of the wing there is a black spot, extending from the anterior border as far as a little beyond the third longitudinal vein, the tip of the marginal cell is also covered by it, that of the submarginal cell, however, is not; the last section of the fourth longitudinal vein in its whole course, converges towards the third and comes very near it at its tip; it is not perceptibly arcuate.

*Hab.* Cuba (Gundlach).

3. *E. notata* WIED. ♂ ♀.—(Tab. IX, fig. 9.) *Chalybeo-nigra*, abdomine femine fasciâ apicali flavâ ornato, pedibus nigris, genibus, tarsorumque basi rufis, alarum maculis duabus nigris, alterâ costali minutâ, alterâ apicali trigonâ, cellulâ costalis basi et stigmate cinereis.

Bluish-black, abdomen of the female with a yellow crossband at the tip, feet black, knees and the root of all the tarsi red; wings with a small black dot in the middle of the costa and with a larger triangular spot at the tip; basis of the costal cell and stigma gray. Long. corp. 0.15—0.16; long. al. 0.15.

SYN. *Ortalis notata* WIED. Auss. Zweif. II, p. 462, 9.

*Euxesta notata* LOEW, Berl. Ent. Zeitschr. XI, p. 300, Tab. II, f. 9.

Of a blackish-steelblue, generally verging on green-blue, often with a violet hue on the middle of the abdomen; rather shining. Front of a saturate yellowish-red, sometimes almost yellowish-brown; with a whitish pollen along the lateral orbit of the eyes; the black hairs are scattered and not conspicuous; the swellings running from the vertex downwards, along the borders of the eyes, generally also the immediate vicinity of the ocelli are shining bluish-black or black. Antennæ brown, ferruginous-red at the basis, which color is more extended on the inner side; third joint rounded. The very considerably excavated face, together with the rather projecting clypeus are bluish-black, very shining; the upper portion rather densely pollinose, and hence opaque, the ground color not being distinctly visible; the lateral swellings of the face are tinged with brownish-red and thinly whitish pollinose. The female has the latter part of the last abdominal segment, as well as the basis of the ovipositor of a saturate yellow color; in the male, I have never observed any trace of this yellow coloring. The first segment of the very much flattened ovipositor is of a very moderate breadth, brownish-black, but with a more or less distinct coppery-red reflection. Feet black, femora in part metallic-black or bluish-black; knees and the root of all the tarsi brick-red, on the front tarsi this red generally reaches only as far as the middle of the first joint, on the hind tarsi as far as the tip, on the intermediate ones as far as the basis of the next joint. Knob of halteres yellowish; stem generally infuscated. Wings hyaline with rather dark veins; at the tip of the costal cell there is a small black dot, which extends posteriorly as far as the second longitudinal vein; at the apex of the wing there is a larger triangular black spot, occupying the end of the sub-

marginal cell and crossing to a small extent the third longitudinal vein, but being exactly limited by this vein near the apex of the wing; the costal cell is tinged with brownish-gray as far as a little beyond the humeral crossvein; the stigma has the same color, but this is sometimes more blackened, especially towards its end; the last section of the fourth longitudinal vein converges in its whole course towards the third vein and approaches it considerably towards its end; shows, however, hardly any perceptible curvature; the fifth longitudinal vein does not quite reach the margin of the wing.

*Hab.* District of Columbia, New York, Illinois, Connecticut (Osten-Sacken).<sup>1</sup>

*Observation.*—Wiedemann gives a description of the male of this species which might easily lead to the conclusion that he had before him a species different from the one I have just described. According to his statement, the male has, on the posterior margin of the penultimate abdominal segment, a saturate yellow crossband. But as Wiedemann's collection contains as *Ortalis notata* the very species which I described under this name and as, among a considerable number of males which I have before me, not a single one is provided with such a crossband, I am compelled to come to the conclusion that Wiedemann mistook the sex of the specimen from which he drew his description; he may have had before him a female the ovipositor of which was bent under the abdomen.

**4. *E. nitidiventris* n. sp. ♀.**—Nigro-viridis, nitida, abdomine femine toto aeneo-viridi et nitidissimo, pedibus gilvis, tibiis anticis totis posterioribusque adversus apicem infuscatis, tarsis adversus apicem fusco-nigris, alarum maculis duabus nigris, alterâ costali minutâ, alterâ apicali trigonâ, cellulæ costalis basi luteâ, stigmate ex luteo cinereo.

Shining black-green, the entire abdomen of the female metallic-green, very shining. Feet saturate yellow, the entire fore tibiae and the posterior ones towards their tip, infuscated; tarsi brownish-black towards the tip; wings with a small black dot on the middle of the costa and with a larger triangular spot at the apex of the wing; basis of the costal cell clay-yellow; stigma yellowish-gray. Long. corp. 0.14—0.15; long. al. 0.14—0.15.

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<sup>1</sup> Mr. Riley gave me a male specimen of *E. notata* which he bred from the pulp of an orange-orange (*Maclura*).—O. S.

Dark-green, shining, the abdomen altogether of a vivid metallic green, very shining. The femora of a saturate dark-yellow; this coloring changes into brownish on the fore tibiæ from the very basis, on the posterior tibiæ farther down; the fore tarsi are saturate yellow at the basis as far as the tip of the first joint, the posterior tarsi nearly as far as the end of the second joint, beyond this the tarsi are brownish-black. The basis of the costal cell is clay-yellow, or pale ferruginous-yellow, as far as a little beyond the humeral crossvein; the stigma is yellowish-gray. In all other respects this species is so very like *E. notata*, that one would be inclined to take it for a mere variety of coloring, unless the much lighter coloring of the feet, combined with the darker coloring of the much more shining abdomen, proved the contrary.

*Hab.* Texas (Belfrage).

**5. *E. costalis* FAB.** ♀.—(Tab. IX, f. 10.) Nigro-chalybea, pedibus nigris, genibus tarsorumque basi rufis, alarum maculis duabus magnis, alterâ costali, alterâ apicali, nigris.

Blackish-steelblue, feet black, knees and roots of the tarsi red; wings with two large black spots, the first in the middle of the costa, the second at the apex of the wing. Long. corp. 0.15; long. al. 0.15.

*SYN. Musca costalis* FAB. Ent. Syst. IV, p. 360, 196.

*Dacus costalis* FAB. Ent. Syst. Antl. p. 278, 25.

*Dacus aculeatus* FAB. Syst. Antl. p. 275, 14.

*Ortalis costalis* WIED. AUSS. Zweifl. II, p. 464, 13.

*Euzesta costalis* LOEW, Berl. Ent. Zeitschr. XI, p. 301, Tab. II, f. 10.

Very like both preceding species, but easily distinguished by the narrower front, the absence of a yellow crossband at the end of the abdomen of the female, the perceptibly larger size of the black spot on the middle of the anterior margin of the wings, the altogether black stigma and the course of the fifth longitudinal vein, which reaches the margin of the wing. Blackish-blue, shining; the head brick-red or of a rusty-red; front anteriorly of a more saturate coloring, narrow, somewhat whitish pollinose on the orbit of the eye; the hairs upon it are rather sparse and not at all conspicuous; the stripes, descending from the vertex along the orbits of the eyes and the immediate surroundings of the ocelli are steel-blue, shining. Occiput blackish, its lower portion and a spot back of the region of the ocelli, brick-red. Antennæ brick-red or more yellowish-red; third joint rounded-

oval, generally somewhat infuscated on the outer side, towards the tip. The larger portion of the rather excavated face shows a steel-blue, shining color, which is but little concealed by the whitish pollen; the projecting clypeus also has a steel-blue reflection. The first joint of the flattened, black ovipositor is of moderate breadth. Feet pitch-black, femora almost bluish-black, knees and basis of all the tarsi brick-red. Halteres of a dirty-whitish or yellowish color. Wings hyaline, almost grayish, with very dark veins; the root of the wings tip to the humeral cross-vein and a little beyond, blackish; the whole stigma, as well as the tip of the costal cell and a spot connected with the latter and reaching as far as the fourth vein, are black; at the apex of the wing there is a large, triangular black spot, covering the tip of the marginal and the end of the submarginal cell, and, moreover, crossing to a considerable extent the third longitudinal vein, so that its posterior limit is not far from the fourth longitudinal vein and runs parallel to it. The last section of the fourth longitudinal vein is only very gently curved and converges towards the third in its whole course, approaching the latter considerably towards its end.

*Hab.* West Indies (coll. Wied.).

**G. E. quaternaria** Loew. ♀.—(Tab. IX, f. 11.) Nigro-violacea, dimidio apicali abdominis flavo, alarum maculis costalibus quatuor nigris.

Blackish-violet, second half of the abdomen yellow; wings with four spots along the anterior margin. Long. corp. 0.12—0.14; long. al. 0.13—0.14.

*Syn.* *Euxesta quaternaria* Loew, Berl. Ent. Zeitschr. XI, 302, Tab. II, f. 11.

Blackish-violet, the middle of the thoracic dorsum, a large portion of the pleuræ and the sides of the abdomen often more blackish-blue. Front rather narrow, ferruginous, along the orbits of the eyes with a very delicate border of white pollen and with coarse black hairs; the little stripes, running from the vertex down the sides of the front are blackish, but hardly shining. Antennæ ferruginous-brown, more reddish at the basis, sometimes of a lighter coloring; the third joint is rounded. Face, including the but little projecting clypeus and the cheeks brownish-red, less excavated than in most of the other species. Occiput for the most part black. Thoracic dorsum with a thin covering of whitish-gray pollen, and hence but little shining; more so on its

sides; the pleuræ likewise are rather shining. The anterior part of the abdomen of a metallic dark-violet hue; the apical half yellow, sometimes with a dark stripe in the middle. The first segment of the very much flattened ovipositor rather broad and long, black, usually with a bronze reflection. Feet black, only the extreme tip of the femora reddish-brown and the basis of all the tarsi brick-red. Halteres yellowish, the stem usually infuscated. Wings hyaline, with four black spots on the anterior margin; the first among these spots, placed on and immediately beyond the humeral crossvein, extends as far as the basis of the anal cell, so that the extreme root of the wing itself is hyaline; the second spot, covering the tip of the costal cell and the very short stigma, with the exception of its extreme end, runs perpendicularly and preserves the same breadth, as far down as the fourth longitudinal vein, beyond which it is still perceptible as a blackish-gray shadow; the third black spot lies opposite the posterior crossvein, is of an elongated triangular shape, and reaches with its tip as far as midway between the third and fourth longitudinal veins, the fourth spot has an irregularly rounded shape and lies quite near the apex of the wing; it covers the extreme end of the marginal cell and the end of the submarginal with the exception of its extreme tip; on its posterior side (that is the side which is nearer the basis of the wing) it crosses the third longitudinal vein; the last section of the fourth longitudinal vein, which is distinctly, although not strongly, curved, converges in its whole course towards the third longitudinal vein, without approaching it more, however, than in the several preceding species.

*Hab.* Cuba (Gundlach).

2d Group. *Wings with two, very much abbreviated, crossbands.*

**7. E. binotata** Loew. ♂.—(Tab. IX, f. 12.) Nigro-chalybea, capite, lateribus segmentorum abdominalium primi et secundi femoribusque luteis, tibiis tarsisque fusco-nigris, alarum fasciis duabus postice valde abbreviatis nigris.

Dark steel-blue, the head, the sides of the first two abdominal segments and the femora yellow; the tibiae and tarsi brownish-black; wings with two very much abbreviated black bands. Long. corp. 0.12; long. al. 0.13.

SYN. *Euzesta binotata* Loew, Berl. Ent. Zeitschr. XI, p. 304, Tab. II, f. 12.



Head dark-yellow; front rather broad, with a very narrow border of white pollen; the hairs upon the front are not conspicuous. The stripes descending from the vertex along the sides of the front and the immediate surroundings of the ocelli are steel-bluish, somewhat shining. Antennæ dark-yellow; their third joint rather round. Face rather excavated, with a white pollen which is less dense in the vicinity of the anterior border of the mouth, and from under which a faint steel-blue reflection is still visible. Clypeus but moderately projecting over the anterior edge of the mouth, generally of a dark-yellow color, seldom with a faint trace of a steel-blue reflection. The upper portion of the occiput, with the exception of a large spot behind the vertex, is steel-blue, with a whitish pollen. Thorax steel-bluish, with a rather whitish pollen and hence but moderately shining. Scutellum, metathorax and abdomen bright, shining, almost metallic black; the sides of the first and second segments of the abdomen have a yellow coloring, which, however, usually does not reach the posterior margin of these segments and sometimes is more expanded in the middle. Front coxæ and femora dark-yellow; tibiæ, with the exception of the extreme basis, and the tarsi brownish-black. Halteres whitish with a dirty-brownish stem. Wings hyaline; immediately beyond the humeral cross-vein there is a small black spot, which extends, in the shape of a crossband, as far as the root of the anal cell; the rather long stigma is black; from its basis a black crossband extends in a somewhat oblique direction as far as the middle of the discal cell; immediately before the apex of the wing, another black perpendicular crossband is situated; anteriorly it is somewhat widened, posteriorly it crosses the fourth longitudinal vein, the last section of the fourth longitudinal vein is moderately but distinctly curved, and converges with the third longitudinal more in its latter half than in its first. The intervals between the black crossbands of the wings of this species, as in most of the others, by transmitted light assume a rather indistinct white coloring, in a similar light, however, the apex of the wings of this species assumes a very striking whitish coloring.

*Hab.* Cuba (Gundlach).

3d Group. *Wings with four crossbands.*

**S. E. annonæ** FAB. ♂ ♀.—(Tab. IX, f. 13.) Nigro-chalybea, fasciis alarum nigris quatuor, secundâ postice abbreviatâ et reliquis paulo latiori.

Dark steel-blue; wings with four black bands, the second of which is abbreviated posteriorly and is somewhat broader than the others.

Long. corp. 0.14—0.15; long. al. 0.14—0.15.

SYN. *Musca annonæ* FAB. Ent. Syst. 358, 189.

*Tephritis annonæ* FAB. Syst. Antl. IV, p. 320, 19.

*Ortalis annonæ* WIED. AUSS. Zweif. II, p. 463, 11.

*Urophora quadrivittata* MACQ. Suites, II, p. 456, 5.

*Euzesta annonæ* LOEW, Berl. Ent. Zeitschr. XI, p. 305, Tab. II, f. 13.

Head brick-red; the little stripes running down from the vertex and the region of the ocelli steel-blue, rather shining; the larger portion of the occiput blackish, with a grayish-white pollen. The front is of only moderate breadth; the hairs upon it are strikingly coarse, more dense upon the pollinose lateral borders, scarce upon the remainder of the surface. Antennæ brick-red, third joint rounded-oval, towards its end brownish and more so on its outer than on its inner side. The face is very moderately excavated; the clypeus moderately projecting, both with a steel-blue reflection and a white pollen. Thorax of a very dark color, verging sometimes on green, sometimes more on steel-blue or violet, and always covered with a rather dense whitish pollen. The scutellum is of a still more dark violet-black color, and less pollinose. The abdomen is of a metallic, but very dark bluish-black or violet-black color. The first segment of the flattened ovipositor is generally still darker. Fore coxæ, with the exception of their basis and the tip of the hind coxæ, brownish-brickred, the former with a white pollen. Femora black; the first pair, and generally also the last, more metallic-black; all are brownish-brickred at the tip; tibiæ blackish-brown; dark brick-red at the tip and often also at the extreme root; tarsi brick-red at the basis, blackish-brown towards the tip. Halteres clay-yellow. Wings hyaline, with four black crossbands. The first lies upon and a little beyond the humeral crossvein and reaches the basis of the anal cell; the second begins at the anterior margin with the but moderately long, black stigma and the blackened extreme tip of the costal cell; it is perpendicular and reaches beyond the fifth

longitudinal vein, without, however, reaching the margin of the wing; the small crossvein lies exactly upon its external limit; the internal one is always sinuate in the vicinity of the fifth longitudinal vein; the third and fourth bands are connected at the anterior margin in such a manner, that the hyaline space between them reaches either exactly as far as the second longitudinal vein, or goes very little beyond this vein; the third band, which is nearly straight and rather perpendicular, runs over the posterior crossvein and almost reaches the posterior margin of the wing; the fourth crossband is of considerable breadth, reaches as far as the fourth longitudinal vein and is continued even beyond it, in the shape of a gray shadow; the second half of the last section of the fourth longitudinal vein is very gently curved anteriorly, so that it converges towards the third longitudinal vein, without approaching it, however, to any considerable extent.

*Hab.* Cuba (Gundlach).

**9. *E. Thomæ* Loew.** ♂ ♀.—(Tab. IX, f. 14.) *Lute chalybea, nitidissima, alarum fasciis nigris quatuor subintegris, ultimis tribus latis.*

Bright steel-blue, very shining; wings with four black crossbands, the last three of which are broad. Long. corp. 0.14—0.15; long. al. 0.14—0.15.

*Syn.* *E. Thomæ* Loew, Berl. Ent. Zeitschr. XI, p. 306, Tab. II, f. 14.

Very like the preceding species, although very probably a distinct one, notwithstanding the great resemblance in all the plastic characters. The differences are the following: the whole coloring of the body is of a lighter and more brilliant steel-blue, which often verges on violet in the middle of the abdomen. The thoracic dorsum is much less pollinose. The second crossband of the wings is broader, approaches more the posterior margin of the wings, and is not sinuate on its inner side in the vicinity of the fifth longitudinal vein. The third crossband is much broader than in *E. annonæ*, especially its anterior portion; the fourth band crosses the fourth longitudinal vein a little, or else the gray shadow beyond the end of this vein is somewhat darker.

*Hab.* St. Thomas (Westermann).

**10. *E. abdominalis* Loew.** ♂ ♀.—(Tab. IX, f. 15.) *Chalybeo-nigra, abdominis basi sordide lutea, alarum fasciis nigris quatuor integris, ultimis duabus ad costam anguste coherentibus.*

Bluish-black, with a dirty-yellow basis of the abdomen; wings with four complete black crossbands, the last two of which are connected by a narrow stripe at the costa. Long. corp. 0.12—0.14; long. al. 0.12—0.14.

SYN. *Euresta abdominalis* Loew, Berl. Ent. Zeitschr. XI, p. 307, Tab. II, f. 15.

Head brick-red or brownish-brickred; the small stripes running down from the vertex along the orbits of the eyes and the surroundings of the ocelli, are steel-blue, shining; almost the whole occiput is black, with a grayish-white bloom. Front rather narrow; rather dense and conspicuously coarse hairs upon the lateral borders, which are covered with white pollen; the hairs upon the remainder of the surface are very scarce. Antennæ brownish-brickred, or brick-red; in the latter case the rounded-oval last joint is more or less infuscated towards its end. The face is moderately excavated, usually for the most part with a shining steel-blue reflection; its white bloom is very thin along the edge of the mouth. Clypeus only moderately projecting, with a more or less distinct steel-blue reflection on the sides. Thorax of a shining, blackish-steelblue color, which usually verges somewhat on green upon its dorsum. Scutellum and metathorax still darker greenish-black, not pollinose. Abdomen more greenish-black than bluish-, or metallic-black, at the basis always dirty clay-yellow. The coloring of the first segment of the flattened ovipositor is the same as that of the abdomen, or a more purely black one. Fore coxæ, at the tip at least, brownish-brickred, with white pollen; femora black, more or less metalescent, with a brownish-brickred tip; tibiæ blackish-brown, only the extreme tip reddish-brown; tarsi reddish-brown at the root, otherwise blackish-brown. Halteres whitish or yellowish. Wings with four not abbreviated black crossbands. The first is broader than in the two preceding species, but is likewise placed upon and immediately beyond the humeral crossvein, and extends as far as the basis of the anal cell. The second band begins at the anterior margin with the black tip of the costal cell and the black stigma; it is rather broad and gradually expands in approaching the posterior margin so that, at this place, its breadth exceeds considerably that of the other bands; the small crossvein lies exactly upon its outer margin. The third band likewise, which runs over the posterior crossvein, has a considerable breadth and a very perpendicular position. The fourth band runs along the

apex of the wing; it is also rather broad and reaches beyond the fourth longitudinal vein; its connection with the third band near the costa is rather narrow, so that the hyaline space, inclosed between them, almost reaches the costa anteriorly. The last section of the fourth longitudinal vein is gently arcuate and slightly converges in its latter half towards the third longitudinal vein (the figure does not give this quite correctly).

*Hab.* Cuba (Gundlach).

*Observation.*—The Museum at Vienna contains a couple of specimens taken in Cuba by Pöppig, which differ, however, by their distinctly smaller size, as well as by a somewhat different picture on the wings; all the four black bands are dissolved into oval black spots, covering the veins, the portions of the bands lying inside of the cells are crossed in the middle by gray stripes. A closer examination, however, proves conclusively that these specimens are incompletely colored ones of *E. abdominalis*. The small size is probably due to the greater contraction in drying of these unripe specimens.

**11. *E. altermans* Loew.** ♂.—(Tab. IX, f. 16.) Obscure chalybea, alarum fasciis nigris quatuor integris, omnibus separatis, tertiâ reliquis multo angustiore.

Dark steel-blue, wings with four complete black crossbands, entirely separate from each other; the third much narrower than the others. Long. corp. 0.13; long. al. 0.13.

*Syn.* *Euresta alternans* Loew, Berl. Ent. Zeitschr. XI, p. 308, Tab. II, f. 16.

Head brick-red or brownish-brickred; the little stripes running down from the vertex along the orbits of the eyes, as well as the surroundings of the ocelli, of a shining steel-blue; the whole occiput blackish, with a whitish pollen. Front rather narrow, with coarse hairs which are more dense on the somewhat whitish, pollinose, lateral borders and more sparse on the remaining surface. Antennæ brick-red or yellowish-red, the third joint oval. Face very much excavated; with the exception of its lower, considerably projecting, portion, it has a steel-blue reflection, but is so thickly covered with a white pollen, that the bluish ground-color is but little apparent. Clypeus rather strongly projecting, brownish-brickred, sometimes with a steel-blue reflection on the sides. Thorax and scutellum of a rather dark, steel-blue color, which turns somewhat to greenish-blue on the thoracic

dorsum; the latter is but little pollinose. Abdomen darker steel-blue, shining, especially on the sides. Feet black; the knees and the first joint of the intermediate tarsi brick-red, the first joint of the hind tarsi brown or reddish-brown towards the basis. Halteres yellowish-white. Wings with four black unconnected bands. The first of them lies, as in the preceding species, on and immediately beyond the humeral crossvein and reaches the basis of the anal cell. The second band begins at the black stigma and runs, expanding somewhat, as far as the posterior margin, in the vicinity of which it gradually becomes fainter; the third band is narrow, perpendicular, and covers the posterior crossvein; the fourth runs along the apex of the wing, is even broader than the second and completely isolated from the third; beyond the fourth longitudinal vein, it becomes very faint. The last section of the fourth vein is rather strongly curved and its latter portion converges towards the third vein.

*Hab.* Brazil? Cuba? (Vienna Museum).

*Observation.*—The description is drawn from a male specimen in the Vienna Museum, labelled: Mann, Toscana 1846. As I have seen the same species, in other collections, marked as Brazilian, I take the designation of the Vienna Museum to be erroneous. I am confirmed in this supposition by the fact that next to the above-mentioned specimen is placed another, a female, pinned on the same kind of pin and labelled in the same manner, which, however, is a specimen of *E. stigmatias*, received hitherto from Cuba and Brazil only. Thus it appears evident that both specimens were sent by the same collector, probably from the same country; and as *E. stigmatias* is a common species in Cuba, the conclusion is not too far fetched that both specimens came from that island. This is the reason why I did not like to omit *E. alternans* in this volume.

**12. *E. stigmatias* Loew.** ♂ ♀.—(Tab. IX, f. 17.) Nigro-viridis, maculâ atrâ inter antennis sitâ insignis, alarum fasciis nigris quatuor, ultimis duabus ad costam conjunctis.

Blackish-green, conspicuous by a deep black spot between the antennæ, wings with four black bands, the last two of which are connected near the costa. Long. corp. 0.13—0.15; long. al. 0.14—0.15.

*Syn. Euzesta stigmatias* Loew, Berl. Ent. Zeitschr. XI, p. 310, Tab. II, f. 18.

Head dark metallic-green or almost steel-blue. Front of a dusky-red; the little stripes running down from the vertex along

the orbits of the eyes, as well as the well-defined ocellar triangle, shining steel-blue. The lateral border of the front shining and generally with a rather distinct steel-blue reflection; immediately above each antenna, a trace of a small swelling is discernible. The hairs on the front are not conspicuous, moderately dense on the sides, very scarce on the remaining surface. The first two joints of the antennæ brownish-black, the rounded-oval third joint reddish-yellow from the basis as far as the arista, more brownish beyond it. Face very much excavated, shining steel-blue, with a whitish pollen on its upper part only; above this, just between the antennæ, is a conspicuous, velvet-black spot. Clypeus very much projecting, shining, steel blue, pollinose on the margins only. The rather broad orbital circles of the eyes brick-red below, at the lower corner of the eyes. Thorax dark metallic-green, somewhat verging on steel-blue; the dorsum with a very thin gray pollen. Scutellum blackish-green. Abdomen of the same color as the thorax, but darker, often with a stronger steel-blue reflection; the last abdominal segments of the male sometimes more bronze-colored. The first segment of the flattened ovipositor metallic-black. Feet black; the tips of the knees and the basis of all the tarsi brownish-brickred. Halteres white-yellowish. Wings with four black crossbands. The first lies, as in several other species, on and immediately beyond the humeral crossvein and extends as far as the basis of the anal cell. The second band, which is rather broad, begins at the costa with the blackish end of the costal cell and the black stigma; it is generally very much fainter beyond the fourth longitudinal vein and disappears entirely between the fifth vein and the posterior margin of the wing; the small crossvein lies almost exactly upon the outer margin of this band. The third band, which is perpendicular, runs over the posterior crossvein and reaches the posterior margin of the wing almost completely; it is broader anteriorly than posteriorly, and is connected with the fourth band on the inside of the marginal cell, so that the hyaline interval between these bands extends exactly as far as the second longitudinal vein. The fourth band, lying along the apex of the wing, is also rather broad and extends as far as the fourth longitudinal vein. The last section of the fourth vein is distinctly curved and in its second half converges towards the third longitudinal vein.

*Hab.* Cuba (Gundlach); Brazil (coll. Winthem).

**13. *E. eluta* Loew.** ♂ ♀.—(Tab. IX, f. 18.) Nigro-viridis, subchalybescens, maculâ atrâ inter antennis sitâ insignis, alarum fasciis nigris quatuor, secundâ latissimâ sed maximâ ex parte valde elutâ, tertiâ et quartâ in cellulâ costali per maculam hyalinam separatis.

Blackish-green, verging on steel-blue, conspicuous by a deep black spot lying between the antennæ; wings with four black bands, the second of which is the broadest, but, for the most part, very pale; the third and fourth are separated by a hyaline spot, lying in the costal cell. Long. corp. 0.14–0.15; long. al. 0.14–0.15.

**Syn.** *Euxesta eluta* Loew, Berl. Ent. Zeitschr. XI, p. 312, Tab. II, f. 19.

Front red or brownish-red; the little stripes, descending from the vertex along the orbits of the eyes and the well-defined ocellar triangle, are shining steel-blue; the hairs on the front are not striking, moderately dense on the but slightly pollinose lateral borders; otherwise very scarce. Occiput blackish-steelblue, with a grayish-white bloom. Antennæ ferruginous-brown or reddish-brown, more brick-red at the basis of the third joint; sometimes the second joint has the same coloring. Face rather excavated, generally steel-blue, or at least reddish along the anterior edge of the mouth only; in some rare cases it has a light steel-blue reflection on its upper part, the remainder brick-red; exactly between the antennæ is a conspicuous velvety-black spot; clypeus but little projecting beyond the edge of the mouth, reddish-brown, with a steel-blue reflection; the orbits of the eyes brick-red or brownish-red near the lower corner of the eye. Thorax dark metallic-green; in less mature specimens greenish steel-blue. Thoracic dorsum only slightly pollinose. Scutellum more blackish-green or blackish-blue. The color of the abdomen is not unlike that of the thorax, but is darker and verges on bluish; its middle sometimes almost violet; the last segments of the male abdomen sometimes bronze-colored. Front coxæ, except the root, brick-red, with white pollen. Feet black, the tips of the knees and the root of all the tarsi brick-red; the tip of the middle tibiæ likewise is generally brick-red; sometimes the extreme tip of the front tibiæ shows a brick-red coloring. Halteres yellowish-white. Wings with four black crossbands. The first lies upon and immediately beyond the humeral crossvein and extends to the extreme basis of the anal cell; it is rather narrow and often pallid. The second crossband is of considerable breadth, begins near the costa with the infuscated tip of the costal cell and the black stigma; but beyond the third,



or the fourth longitudinal vein it is so very faint that it extends to the posterior margin of the wing in the shape of a gray shadow; the small crossvein lies, when the band is not too pale, almost exactly upon its external margin. The third band passes over the posterior crossvein, is narrow and generally rather pale, except in the vicinity of the anterior margin; towards the posterior end of the crossvein it almost disappears; from the fourth band it is separated by a rather large, whitish-hyaline spot in the marginal cell; behind the second longitudinal vein fully colored specimens have, on the outer side of this third band a rather distinct gray shadow, between which and the fourth band only a narrow, whitish hyaline interval remains, from which, however, the above-mentioned hyaline spot near the costa is completely isolated. The fourth band, which lies along the apex of the wing, extends as far as the fourth longitudinal vein, or else it crosses it in the shape of a gray shadow. The last section of the fourth longitudinal vein is rather strongly curved and convergent towards the third vein.

*Hab.* Cuba (Gundlach).

Gen. VIII. **CHÆTOPSIS** Low.

*Charact.*—*Front* of medium breadth, somewhat narrower towards the vertex, with a row of bristly hairs on the lateral border; the remaining surface not hairy.

*Antennæ* rather short; third joint very little excised on the upper side, with a sharp anterior corner and a thin, bare arista.

*Face* but moderately excavated; *clypeus* but little projecting over the anterior border of the mouth.

*Thorax* with bristles on its posterior part only; *clypeus* convex, with four bristles.

*Wings*: posterior angle of the anal cell drawn out in a point; last section of the fourth longitudinal vein, towards its end, but very little convergent with the third vein; posterior crossvein perpendicular.

The species known to me are conspicuous for the striking length of the bristles, inserted on the posterior part of the thorax and on the scutellum. Their coloring is metallic; the wings are adorned with well-defined black crossbands. They cannot well be confounded with the species of the preceding genus, on account of their greater slenderness, and more especially, on account of the different shape of the third antennal joint and of the front, which is hairy on its lateral borders only. From the two next following

genera, which likewise have the third antennal joint with a sharp anterior angle, the species of the present genus are sufficiently distinguished by their less slender shape and the different structure of the anal cell, not to mention other characters.

**1. *C. ænea* WIED.** ♂ ♀.—(Tab. IX, f. 19.) Viridis, antennis fusconigris, basi tamen articuli tertii luteâ, alis trifasciatis.

Metallic-green; antennæ brownish-black, the basis of the third joint yellow; wings with three bands. Long. corp. 0.16—0.18; long. al. 0.17—0.18.

SYN. *Ortalis ænea* WIED. Auss. Zweif. II, p. 462, 8.

*Ortalis trifasciata* SAY, Journ. Acad. Phil. VI, p. 184, 8.

*Urophora fulvifrons* MACQ. Dipt. Exot. Suppl. V, p. 125, Tab. VI, f. 9.

*Chatopsis ænea* LOEW, Berl. Ent. Zeitschr. XI, p. 315, Tab. II, f. 21.

*Trypeta (Aciura) ænea* v. d. Wulp, Tijdschr. voor Ent. 1867, p. 137, Tab. V, f. 12—14.

Front red, on each side with a broad band, which is covered with white pollen. The ocelli rather far distant from the edge of the vertex; the region of the ocelli, as well as the little stripes descending from the vertex along the orbits of the eyes are blackish-green, only very little shining. Frontal lunule with white pollen. Antennæ rather short; the first two joints brown, the second sometimes in part brownish-yellow; the third joint rather broad, very little excised on the upper side, always with a sharp anterior angle, brownish-black, reddish-yellow at the basis. Face only little excavated, steel-bluish, but rather opaque on account of a whitish pollen; the edge of the mouth usually brick-red. The clypeus has but a small transverse diameter and is but little projecting over the anterior edge of the mouth. Thorax and scutellum shining metallic-green, upon the dorsum with a trace of a white bloom. Abdomen of the same color, or somewhat more bronze-green, the last joints of the male abdomen generally blackish-green. With less mature individuals the coloring of thorax and abdomen is more bluish-green, and at the basis of the latter an unmetallic, dirty-yellow coloring may be seen. The coloring of the feet is variable; in some specimens they are altogether pale-yellow, only a little darker at the tip of the tarsi; as this occurs in those specimens which have the basis of the abdomen yellow, one might almost be led to the conclusion that they form a distinct species; however, the absolute similarity of all the other characters renders this conclusion very improba-

ble; darker specimens have the color of the feet more brownish-yellow, the root of the front coxæ and the tip of the tarsi dark-brown; the femora of such specimens often show conspicuous black, metallic-green longitudinal stripes; the darkest specimens have the whole basal half of the femora, and even more, of this black coloring, while the tibiae also are partly infuscated. Halteres yellowish-white. Wings with three brownish-black bands; the veins are black upon these bands, but ochre-yellow elsewhere, which gives the whole basal part of the wing an ochre-yellowish tinge. The first band begins at the costa with a short black stigma, is perpendicular and rather dark, as far as the fourth longitudinal vein and even beyond; the remainder of the band, as far as the posterior margin of the wing, is usually very faint; the small crossvein is a little beyond the margin of this band; the second band runs over the posterior crossvein and is perpendicular and rather broad; its posterior end is very pale; with the third band it is generally connected only by a dark border along the costa; sometimes, however, this border becomes broader and extends in some specimens as far as the second longitudinal vein. The third band, running along the apex, is likewise rather broad, extends as far as the fourth longitudinal vein, and even beyond it, in the shape of a gray shadow. The last section of the fourth longitudinal vein, beyond its middle, converges towards the third; near its tip, however, this convergency becomes again much less.

*Hab.* United States, rather common (Osten-Sacken); Louisiana (Schaum) Cuba (Gundlach).

*Observation 1.*—The comparison of the types in Wiedemann's collection do not allow any doubt about the determination of this species; they belong to the variety of a paler, but not of the palest, coloring. Say's good description of *Ortalis trifasciata* refers to the variety with dark feet. That Macquart's *Urophora fulvifrons* belongs here seems certain; that he placed the species in the genus *Urophora* is no objection, because he did the same with several *Ortalidæ*; the figure of the wing, which he gives, is incorrect, as the comparison of the description shows; the latter proves conclusively that the second crossvein on the middle of the wing is an arbitrary addition; it seems that Macquart drew the small crossvein correctly on the extreme limit of the first cross-band; later, however, in finishing his figure, he noticed that in

consequence of the very exaggerated breadth of the interval between the first and second bands, the position of the small crossvein with regard to the posterior one had become altogether distorted, and in order to correct this, he may have drawn the small crossvein a second time, at a correct distance from the large one. Mr. Van der Wulp has erroneously taken *Chætopsis ænea* for a *Trypeta* and, supposing it a new species, accidentally described it under the same specific name.

*Observation 2.*—The *Urophora ænea* Macq. (Suites, etc., Dipt. II, p. 458, 13), may be a synonym of the present species, although I do not consider this as certain. The figure of the wing, as given in Dipt. Exot. II, 3, Tab. XXX, f. 7, shows at the basis of the wing an extensive and very conspicuous black spot, of which there is no vestige in *C. ænea*. It seems certain that *Urophora ænea* Macq. is a species belonging to the present group of *Ortalidæ*.

**2. *C. debilis* Loew.** ♀.—(Tab. IX, f. 20.) *Viridi-chalybea*, antennis totis pedibusque flavis, alis trifasciatis.

Greenish-blue; the entire antennæ and the feet yellow; wings with three bands. Long. corp. 0.12; long. al. 0.11.

*Syn.* *Chætopsis debilis* Loew. Berl. Ent. Zeitschr. XI, p. 318, Tab. II, f. 22.

Very like the preceding species, but smaller; the white bloom forming a border on both sides of the front is comparatively a little broader; it has a single row of four bristles upon it, whereas in the preceding species these hairs are much more numerous. The antennæ are altogether yellow and their third joint upon its upper side is somewhat more excised. The stigma is comparatively smaller; the three bands have the same position, but are less pale towards the posterior margin; the last two are entirely separated from each other, which is very seldom the case with *Chætopsis ænea*; the last section of the fourth vein is much more straight and shows only a vestige of a slight convergency towards the third longitudinal vein. The coloring of the described specimen is not green, but greenish steel-blue; of a dirty-yellowish at the basis of the abdomen; but as it is a rather immature specimen, these differences cannot have much weight. The first segment of the flattened ovipositor is comparatively long.

*Hab.* Cuba (Gundlach)

Gen. IX. **HYPOECTA** Loew.

- Charact.*—*Front* of an equal, rather considerable breadth, somewhat projecting when viewed in profile; delicately hairy on the sides only.  
*Antennæ* short; third joint very much excised on the upper side, with a very sharp anterior corner and with a thin, bare arista.  
*Face* not excavated, somewhat retreating on the under side; *clypeus* rudimentary, not projecting over the edge of the mouth, of a very small transverse diameter.  
*Thorax* with bristles on its hind part only; *scutellum* convex, with four bristles.  
*Wings*: posterior angle of the anal cell pointed, open; the last section of the fourth longitudinal vein converges somewhat towards the third; the posterior crossvein perpendicular.

The species of this genus are considerably more slender than the species of *Chætopsis* and their shape is somewhat more like that of *Eumetopia*. The third antennal joint, the shape of which reminds one of *Ceroxys*, the not excavated face, the rudimentary clypeus and the open anal cell, are easy to recognize. The ovipositor is conspicuously broad, and so closely joined to the abdomen that it may be easily mistaken for its last segment. The typical species is *H. longula* Loew, Berl. Ent. Zeitschr. XI, p. 319, Tab. II, f. 23, from Santos (in Brazil).

No North American species are as yet known.

Gen. X. **STENOMYIA** Loew.

- Charact.*—*Front* of equal breadth, somewhat projecting in profile, hairy on the sides; upon the remaining surface with two longer hairs only.  
*Antennæ* rather short, third joint hardly excised upon the upper side, but with a sharp anterior angle; arista thin and bare.  
*Face* not excavated, somewhat retreating, with a slight depression under each antenna; gently convex between these depressions; *clypeus* of moderate transverse diameter, somewhat projecting over the border of the mouth.  
*Thorax* with bristles on its posterior part only.  
*Wings* comparatively long; posterior angle of the anal cell sharp, but not pointed, last section of the fourth longitudinal vein about double the length of the preceding section, gently converging towards the third longitudinal vein; posterior crossvein rather perpendicular.

The striking slenderness of the narrow body and the metallic coloring, are points of resemblance between the species of this genus and those of *Eumetopia*; the picture of the wings is like-

wise a similar one. The former are at once distinguished, however, by the front, which is not conically projecting. They are characterized also by the shape of the wings and the venation, which it will be easier to understand from the figure than from a description.

**1. *S. tenuis* Loew.** ♂.—(Tab. IX, f. 21.) *Chalybeo-viridis*, pedibus nigris, basi tarsorum rufa; alis cinereis, stigmatibus et plaga permagna apicali nigris.

Greenish-steelblue, the feet black, the root of the tarsi red; the grayish wings have a black stigma and a large black spot at the apex. Long. corp. 0.14; long. al. 0.13.

SYN. *Stenomyia tenuis* Loew, Berl. Ent. Zeitschr. XI, p. 321, Tab. II, f. 24.

Front brown, almost black above, rather hairy along the orbits of the eyes, upon the remaining surface only with two more elongated hairs; the little stripes running down from the vertex along the orbits of the eyes and the ocellar triangle are dark bluish-green, shining. Antennæ black; the second joint at its upper corner to a certain extent dirty-whitish; third joint rather broad, upon the upper side hardly excised, but with a sharp anterior corner. Face somewhat retreating, with a distinct depression under each antenna, longitudinally convex along its middle, dark steel-blue, shining, but on its upper half with a thin, whitish bloom. Clypeus of a very moderate transverse diameter, but distinctly projecting over the upper border of the mouth, deep steel-blue and shining. Palpi black. Eyes large and rather round, their horizontal diameter, however, is a little larger than the vertical one. Cheeks narrow. Thorax dusky blue-green, rather shining, scutellum greenish-black, but little shining, with an entirely even upper side. The narrow and long abdomen has the same coloring as the thorax; however, towards its extremity it gradually becomes more black and opaque. Feet black; femora and tibiæ with metallic, dark bluish-green reflections; the extreme tips of the tibiæ and the root of the tarsi are dark brick-red, the remainder of the feet brownish-black. Halteres whitish. Wings long and narrow, grayish, the root and a rather large spot immediately behind the stigma lighter; the rather small, narrow stigma is of a black color, which extends below it as far as the second longitudinal vein; the last third of the wings, beginning at the costa as far as the fourth longitudinal vein, is tinged with

blackish; this color, at its inner border, between the third and fourth longitudinal veins, is very pale, and extends sometimes as a gray shadow even beyond the fourth vein; the first, second, third, and fifth longitudinal veins are conspicuous for their stoutness and black color; the basis of the second vein and the portion of it lying in the clear spot beyond the stigma, are of a paler color and less stout. The small crossvein is immediately below or but little beyond the end of the stigma; but always beyond the middle of the discal cell; the posterior crossvein is perpendicular; the last section of the fourth longitudinal vein is conspicuous for its great length and converges gently towards the third; anal cell with a sharp angle, which is not, however, drawn out in a point.

*Hab.* Georgia.

Gen. XI. **EUMETOPIA** Macq.

*Charact.*—*Front* very much projecting anteriorly, so that the head, seen in profile, appears conical; upon its sides and its anterior part it is sparsely beset with short, not erect, hairs.

*Antennæ* of middle size; third joint oval, with a bare arista.

*Face* unusually retreating, almost horizontal, below each antenna distinctly excavated and with a small ridge between these impressions; *clypeus* small, but distinctly projecting over the anterior edge of the mouth.

*Wings* narrow and rather long; stigma very narrow, posterior angle of the anal cell acute; the last section of the fourth vein somewhat converging towards the third near the tip.

The species of this genus are always bare, very slender and have a metallic coloring; moreover, they are easily distinguished by the extraordinary projection of their foreheads and the conical profile of their heads; the picture of their wings only consists in a more or less extended black spot on the apex.

1. ***E. rufipes* Macq.** ♂.—(Tab. IX, f. 22.) Viridis, pedibus luteis; alarum apice nigro.

Green, feet dark-yellow; wings with a blackish apex. Long. corp. 0.2; long. al. 0.13.

*Syn.* *Eumetopia rufipes* Macq. Dipt. Exot. Suppl. II, p. 88, Tab. VI, f. 2.

*Eumetopia rufipes* Loew, Berl. Ent. Zeitschr. XI, p. 322, Tab. II, f. 25.

Front reddish-brown, often very dark, the projecting portion on both sides of a lighter coloring; moreover, both sides of the front have a white, pollinose margin; the sides and the anterior

portion bear some scattered, short, neither numerous nor erect hairs; the little stripes running down from the vertex along the orbits of the eyes and ocellar triangle are of a shining metallic-green; the latter is somewhat distant from the vertex. Antennæ rather deep black; face and clypeus moderately shining, bluish-black; the lower orbit, however, reddish-brown, with a narrow white border. Palpi and proboscis dark-yellow. The thorax, the moderately convex scutellum, and the abdomen shining metallic-green; the latter, however, becomes more opaque and darker towards its end. The fore coxæ altogether, the second joint of the posterior ones and the feet of a rather dark, saturate yellow coloring, but by no means red; the front tarsi altogether and the tip of the posterior ones brownish-black. Wings narrow, somewhat grayish-hyaline; the veins are tinged with yellow at the basis and in the proximity of the anterior margin, as far as the black spot on the apex; this gives to those parts of the wings a yellowish coloring; the other veins are blackish; a large brownish-black spot on the apex of the wing occupies almost one-quarter of the length of the wing and extends beyond the fourth longitudinal vein. The small and narrow stigma is yellowish. The small crossvein generally lies only a little beyond the end of the stigma and very little beyond the middle of the discal cell; the last section of the fourth longitudinal vein is perceptibly longer than the interval between both crossveins, and gently converges near its end towards the third vein; the posterior crossvein is always perpendicular; the posterior angle of the anal cell acute.

*Hab.* United States, not rare (Osten-Sacken).

**2. *E. varipes* Loew.** ♀.—(Tab. IX, f. 23.) Viridis, femoribus nigris, genibus tibiisque luteis, alarum apice nigro.

Green, femora black, knees and tibiæ yellow; wings with a blackish apex.

Long. corp. 0.25; long. al. 0.12.

*SYN.* *Eumetopia varipes* Loew, Berl. Ent. Zeitschr. IX, p. 181.

*Eumetopia varipes* Loew, Berl. Ent. Zeitschr. XI, p. 323, Tab. II, f. 26.

Very like *E. rufipes*, but easily distinguished on account of the different coloring of the feet. Front almost black. The palpi of the only specimen in my possession seem to be yellowish-brown. Scutellum more flattened than that of *E. rufipes*. Coxæ and femora black with a bluish-green metallic reflection;



the tip of the femora and the tibiæ clay-yellow, the latter sometimes brownish-yellow; tarsi brown, the posterior ones paler at the basis. The first segment of the flattened ovipositor black. The wings of the same outline as those of *E. rufipes*, but the veins at the basis and in the vicinity of the anterior margin less yellow; the small crossvein is far beyond the middle of the discal cell, and hence it is less distant from the posterior crossvein; the fifth longitudinal vein is interrupted at a somewhat greater distance from the posterior margin of the wing and the last section of the fourth vein converges a little more towards the third; the blackish spot at the apex of the wing is perceptibly larger, so that it occupies more than one-fourth of the length of the wing. All the rest as in *E. rufipes*.

*Hab.* Cuba (Gundlach).

*Second Section: RICHARDINA.*

**Gen. I. CONICEPS** nov. gen.

*Charact.*—*Head* in shape like a long, somewhat flattened cone; *Front* rather broad, eyes rather distant from the posterior edge of the head; their horizontal diameter somewhat longer than the vertical one.

The first two antennal joints short, the third elongated and of equal breadth, *arista* bare.

The *metathoracic bristle* indicated only by a hardly perceptible little hair; *prothoracic bristle* not extant.

*Scutellum* with two bristles.

*Abdomen* slender and elongated.

*Femora* not incrassated, unarmed; the under side of the hind ones with some rather stiff bristles.

*Wings*: posterior angle of the anal cell abbreviated; crossveins not approximated; the smaller one on the middle of the discal cell; the third and fourth longitudinal veins parallel.

The present genus is very like *Eumetopia* on account of its narrow, elongated shape and its strongly projecting front. I place it here in order to bring it as near as possible to *Eumetopia*, although I am far from considering it as a typical genus of the group *Richardina*. It is distinguished from *Eumetopia* not only by the abbreviated angle of the anal cell, but also by the still more projecting forehead, by the somewhat turgid, cushion-shaped occiput, and by the comparatively shorter, but broader wings.

possible, from Macquart's statements. The characters which prevent me from uniting this genus with the following are: the front, very much projecting in profile, the much shorter and stronger femora, the wings, which are not attenuated towards their basis, and the strong convergency of the third and fourth longitudinal veins. If the auxiliary vein is really as far distant from the first longitudinal as Macquart's figure shows it, this would furnish one distinctive character more.

Gen. IV. **STENOMACRA** nov. gen.

*Charact.*—*General shape* almost like *Sepsis*.

*Front* rather broad, somewhat narrower anteriorly.

*Ocelli* closely approximated to each other, almost in the middle of the front.

*Antennal arista* with a very distinct pubescence.

No mesothoracic and, to all appearances, no prothoracic bristle.

*Scutellum* with two bristles; *metathorax* sloping.

*Abdomen* narrow, almost pedunculate.

*Feet* slender, femora not incrassated, the intermediate ones attenuated towards the end; the hind femora a little longer than the middle ones; all are beset with spines towards the tip.

*Wings* rather large, very much attenuated towards the basis; posterior angle rounded off; the auxiliary vein very much approximated to the first longitudinal, coalescing with it at the tip; the second longitudinal reaches the margin of the wing far from the apex; the small crossvein is far before the middle of the discal cell; the last section of the fourth longitudinal vein almost parallel to the third vein; posterior angle of the anal cell obtuse.

1. **S. Guérini** Bigot. ♂ ♀.—(Tab. IX, f. 25., *Rufescens*, pleuris, scutello, metanoto abdominisque basi nigris; alæ hyalinæ, strigulæ subbasali et maculâ magnâ apicali nigris.

Reddish, pleuræ, scutellum, metathorax and the basis of the abdomen black; wings hyaline with a little black streak at the basis and a large black spot at the apex. Long. corp. 0.20; long. al. 0.20—0.22.

SYN. *Sepsis Guérini* Bigot, De la Sagra, Hist. física, etc., p. 822, Tab. XX, f. 9.

Ferruginous-red, rather shining, the upper part of the occiput, as well as the region of the vertex and the little stripes running down from it upon the front, sometimes shining black, almost metallic. Front rather broad, somewhat narrower anteriorly; the bristles of the vertex long; the bristle in front of them, inserted upon the little stripe, is likewise long, removed to almost the middle of the front. The ocelli, near which the ordinary two

bristles are placed, are likewise removed to about the middle of the front and are close to each other. Antennæ descending to the edge of the mouth; the first two joints yellow; the third more or less infuscated; the arista with a very distinct, somewhat rare, pubescence. Face of the *Dacus*-like shape, peculiar among the *Richardina*; proboscis and palpi sometimes of a dirty reddish-yellow, sometimes more brownish-ferruginous. The thoracic dorsum somewhat ferruginous; only very dark specimens have it black; the hairs upon it are placed in four distinct longitudinal rows, the intermediate ones being very closely approximated. Scutellum convex, with two bristles, black ferruginous on the sides in very pale-colored specimens only. Pleuræ, with the exception of the humeral region, as well as the whole metathorax, black. The basis of the abdomen is black to a greater or less extent; in rare specimens only does this color reach the posterior margin of the rather considerably elongated first abdominal segment; in some specimens, however, this color extends to the very end of the abdomen, or, at least, turns here into blackish-brown. The ovipositor, which is longer than the last three abdominal segments taken together, is usually black or blackish-brown; its upper side is excavated (at least in dry specimens), and its under side convex, and hence, it is less flattened than in the other genera of the *Richardina*. Coxæ pale-yellow. Front feet pale-yellowish; the tibiæ towards the basis and the tarsi, beginning from the second joint, infuscated; femora not incrassated, beset with a few, but rather strong, spines on the under side towards its end. The anterior half of the middle femora dark-brown and somewhat incrassated; the posterior half thin and dark-yellow; the greater part of the under side sparsely spinose; middle tibiæ dark-brown, in most specimens, gradually becoming yellow towards the tip; tarsi yellowish, brownish towards the tip. Hind femora not incrassated, whitish, the last third brownish-yellow, brownish towards the tip; both shades separated by an oblique brownish-black ring; hind tibiæ and tarsi as in the intermediate pair of feet. Wings very much attenuated towards the basis, hyaline; their anal angle not projecting at all; from the tip of the costal cell a narrow black streak extends over the incrassated point, where the third longitudinal vein originates and over the crossveins, closing the little cells at the basis of the wing; the apex of the wing is occupied by a large black spot,

which runs from the anterior to the posterior margin, but is very much diluted beyond the fourth longitudinal vein. The second longitudinal vein is gently curved forward and ends some distance from the tip; the small crossvein is before the middle of the discal cell; the last section of the fourth longitudinal vein is almost parallel to the third vein; the posterior angle of the anal cell is rounded.

*Hab.* Cuba (Gundlach).

*Observation.*—Through the kindness of Dr. Gundlach, who sent me the specimens, I have been informed of the identity of this species with the one described by Bigot. I have not succeeded yet in comparing De la Sagra's work, which contains the description, and I draw the attention of those, to whom this work is accessible, to the fact, that among the Cuban species described by me, one or the other may have been previously described by Mr. Bigot in that volume.

Gen. V. **SYNTACES** nov. gen.

*Charact.*—*Front* moderately broad, broader above (according to Macquart's statement, his figure, on the contrary, shows a front narrower above).

*Antennal arista* pubescent.

*Feet* slender; all the femora thin and all armed.

*Wings:* posterior angle of the anal cell rectangular; crossveins not approximated; the last section of the fourth longitudinal vein only moderately convergent with the third.

The typical species is *Setellia apicalis* from Brazil, described by Macquart (Dipt. Exot. II, 3, p. 249). As I have not seen this species, I have borrowed the generic characters from that author's description and figure, which gives these characters a somewhat uncertain basis. The close relationship to the next following genus is, in my opinion, evident; still, it does not seem advisable to unite them, as, in the present genus, the front femora are weaker and armed with less conspicuous spines; as the hind feet are much less elongated in comparison to the front feet; as the posterior angle of the anal cell is not obtuse, but rectangular, and as the second longitudinal vein has no stump of a vein upon it; nevertheless it is not impossible that the examination of a specimen would lead to a different conclusion from that which seems warranted by Macquart's description.

## Gen. VI. EUOLENA nov. gen.

*Charact.*—*Front* very broad, very little narrowed anteriorly; the excavation of its upper part very shallow; the ocelli near the vertex and closely approximated to each other.

*Antennal arista* with a very short pubescence.

No mesothoracic bristle, and, as it seems to me, no prothoracic one.

*Scutellum* with four bristles; the lateral ones weak and small.

*Feet*: front femora rather strong, with conspicuously long and strong spines; the four posterior feet remarkably long and slender, their femora with small spines near the tip only, otherwise these femora are thin and very long, especially the intermediate ones.

*Wings*: posterior angle of the anal cell obtuse; the small crossvein a little beyond the last third of the discal cell; opposite this crossvein, the second longitudinal vein emits a little stump of a vein into the submarginal cell; the last section of the fourth longitudinal vein is nearly parallel to the third.

The typical species is *Michogaster egregius*, from Columbia, described by Gerstæcker (Stett. Ent. Z. XXI, p. 179). I possess the male only. The ovipositor of the female is called sugar-loaf shaped by the author; which would indicate that it is less compressed than in the other *Richardina*; it may be somewhat of the same shape as in *Stenomacra Guérini*.

## Gen. VII. IDIOTYPA nov. gen.

*Charact.*—*Front* very broad, not narrowed anteriorly; ocelli rather approximated to the edge of the vertex, and placed close to each other.

*Antennal arista* with a short pubescence.

No mesothoracic bristle; a weak prothoracic one.

*Scutellum* with two bristles; *metathorax* sloping.

*Abdomen* slender and elongated, almost pedunculate at the basis.

All the *femora* strong and armed with spines.

*Wings*: posterior angle of the anal cell quite obtuse; the small crossvein beyond the last third of the discal cell; opposite this crossvein the second vein has a stump of a vein, inside of the submarginal cell, and a second one on the opposite side, in the marginal cell, nearer to the apex of the wing; the last section of the fourth longitudinal vein almost parallel to the third.

**1. *I. appendiculata* n. sp.** ♂ ♀.—(Tab. IX, f. 26.) Ex ochraceo ferruginea, thorace flavo-vario, alarum dimidio anteriore ex ochraceo ferrugineo, posteriore subhyalino, dilute lutescente.

Yellowish-ferruginous, with the thorax marked with yellow; the anterior half of the wings ochre-brownish, the posterior half almost hyaline, yellowish. Long. corp. 0.44; ♀ cum terebrā 0.52; long. al. 0.4—0.41.

Of this species I possess a very well preserved, and, as it seems, particularly fully-colored female, and two much paler males, probably having faded through long exposure. This difference in coloring notwithstanding, I have not the least doubt that both sexes belong to the same species. The condition of the specimens induces me, however, to begin with the description of the female and to add afterwards those characters by which the male specimens differ from it.

*Female*.—Head rather dark-yellow, of the ordinary *Dacus*-like shape; the front of considerable, and altogether equal, breadth; occipital bristles rather strong; the lateral bristles in front of them are wanting; likewise the bristles generally inserted near the ocelli; the ocelli are approximated to the edge of the vertex and close to each other; a black, biarcuate band runs from the orbit of the eye on one side to that on the other, across the ocelli; immediately above the antennæ there is another black band, not reaching the orbits, the upper limit of which forms a less arcuate, the lower limit a more arcuate curve. In consequence of the very approximated position of the antennæ, the frontal lunule is more isolated from the face, than is the case in any other of the *Ortaliidæ* I am acquainted with. Antennæ brownish ochraceous-yellow; the third joint comparatively long; the arista with a short, but very distinct, pubescence. The lower corners of the central portion of the face rather blackish. The short, but rather broad palpi ochraceous-yellow, brownish-black at the basis. The occiput shows, not far from the edge of the vertex, a narrow, black cross-band, not quite reaching the orbit of the eye. The thorax shows a very variegated picture; the very broad middle stripe, running from end to end, is of a brownish-ferruginous color, which changes into black towards its posterior third; this stripe is divided in two by a blackish, rather indistinct longitudinal line; it is separated from the lateral stripes by a longitudinal line of ochraceous-yellow pollen; the broad lateral stripes are crossed by the transverse suture, which is covered with pale ochraceous-yellowish pollen; the anterior portion of the lateral stripes is black and leaves exposed only the pale yellow humeral stripe; the posterior portion of the lateral stripe is black on the side turned towards

the middle stripe, otherwise brownish-ferruginous. Scutellum short, with two bristles, pale-yellow. Pleuræ black; the humeral region, including the prothoracic stigma and a broad band, running from the root of the wing to the interval between the fore and middle coxæ, pale-yellow; the suture, lying in this band and running down from the root of the wing, is margined with brownish-black. Metathorax black, separated from the pleuræ by a broad yellow stripe. The first abdominal segment rather long, very slender, considerably incrassated, however, towards its end, so that here it equals in breadth the following segment; its first third is black, the second pale-yellow, the remainder, as well as the remaining portion of the abdomen, yellowish-ferruginous, almost ochre-brownish, and beset with a short pubescence of the same coloring. Ovipositor of the color of the abdomen; quite flat; the first segment not quite so long as the last three abdominal segments taken together; rather narrow towards its end. Coxæ brownish-black; the second joint of the front coxæ, the tip of the first joint and the second joint of the middle ones, yellow. All the femora beset with spines, not incrassated, but strong, black, yellow to a small extent at the basis only, yellowish-red to a considerable extent towards the end. Front tibiæ reddish-yellow; the four posterior ones of a purer yellow with reddish-yellow tips. All the tarsi yellowish-red; the front tarsi from the second joint and beyond dark-brown; the other tarsi infuscated at the tip only. The hairs on the feet are very short, and of the same color as the ground upon which they are inserted. Wings comparatively long and narrow, with ferruginous veins; the anterior half has a yellowish rusty-brownish tinge, which is more ferruginous-yellow towards the basis, and more brownish towards the apex; the posterior limit of this coloring is almost rectilinear and reaches the fourth longitudinal vein at its root and at its tip only. The whole posterior half of the wing has a decidedly yellowish tinge, but is rather transparent. The second longitudinal vein is rather straight, gently bent forward towards its end only; it reaches the margin not far from the apex of the wing; two conspicuous stumps of veins project from it not far from each other; both are perpendicular, but placed at the opposite sides of the principal vein; one is just opposite the small crossvein, the other somewhat nearer to the apex of the wing; the small crossvein itself is a little beyond the last third

of the discal cell; the last section of the fourth longitudinal vein is almost parallel to the third vein; the posterior angle of the anal cell is quite obtuse.

*Males*.—The two specimens which I have before me differ from the females by the absence of the upper black crossband on the front, of the black crossband of the occiput and of the spots on the face which have a black coloring; all which in the female is described as black or blackish-brown, is of a dingy rusty-brown in the male. As, at the same time, the contrast between the yellow and the ferruginous regions is less striking, this gives these specimens a less variegated appearance than that of the above-described female. The first abdominal segment is just as narrow as in the female; but this is less apparent here, as the posterior part of the abdomen is less broad.

*Hab.* Cuba (Gundlach).

Gen. VIII. **STENERETMA** nov. gen.

*Charact.*—*Front* very broad, not attenuated anteriorly; *occiput* very convex; *cheeks* broad; *ocelli* small and rather approximate to each other.

*Arista* thin and bare.

A strong mesothoracic bristle; no prothoracic one.

*Scutellum* with two bristles; *metathorax* sloping.

*Abdomen* slender and elongate, attenuate towards the basis.

*Femora* of medium strength, all unarmed.

*Wings* but little developed, short and exceedingly narrow, attenuate in the shape of a wedge towards the basis, so that their surface beyond the fifth longitudinal vein is nothing but a narrow, veinless strip; the auxiliary vein so closely approximated to the first longitudinal vein, that they can be distinctly told apart at their end only; the two ordinary crossveins approximate to each other; the small one lies but little beyond the middle of the wing; second basal cell very small and narrow; the anal cell and the sixth longitudinal vein are wanting, with the exception of a rudiment of the latter, which does not reach beyond the axillary incision.

As the group of the *Ulidina* contains the genera with a more developed anal cell, the group of the *Richardina* on the contrary those with a less developed one, there can be no doubt that the present genus, in the incompletely developed wings of which the anal cell is altogether wanting, belongs to the *Richardina*; and that this is its true location is proved by its relationship to



*Idiotypa*, especially evident in the structure of the abdomen. Among the differences of these two genera I will only mention that the structure of the head of *Idiotypa* is not unlike that of *Dacus*, while the head of *Steneretma* resembles that of *Tritoxa*. As *Steneretma* and *Tritoxa* also agree in the presence of a mesothoracic bristle and in the absence of a prothoracic one, the former genus, if its first longitudinal vein showed a distinct pubescence, would have to be placed next to *Tritoxa*.

1. *S. laticauda* n. sp. ♀.—Lutea, segmentis abdominalibus singulis postice anguste et æqualiter fusco-marginatis, tarsis præter basim nigro-fuscis, alis luteo cinereis, albido-bifasciatis.

Dark-yellow, the single abdominal segments on their posterior margin with a narrow infuscated border; the tarsi, with the exception of the basis, blackish-brown; wings yellowish-gray with two whitish cross-bands. Long. corp. 0.14; cum terebrâ 0.19; long. al. 0.11—0.12.

Of a dark-yellow color, shining. The broad, rather convex front bears, besides the long bristles on the vertex and in the region of the ocelli, a moderate quantity of rather long black hairs; the comparatively strong convexity of the occiput almost obliterates the usual edge between it and the vertex. The antennæ are of the same color as the rest of the body, and of more than half the length of the face; their third joint elongate, rounded at the tip; the thin and bare arista is very long. Clypeus, palpi, and proboscis likewise partake of the general coloring of the body. Thorax but little elevated and rather narrow in comparison to its length; its dorsum on the sides and on its posterior border with a few rather long black bristles; upon the remainder of its surface only with a short, black pubescence. Scutellum small, bare, with the exception of the two bristles upon its end. Pleuræ glabrous; besides the mesothoracic bristle they bear only a single bristle not far below the root of the wing. The abdomen is narrow and elongate, attenuate towards the basis, not so much, however, as in the females of *Idiotypa appendiculata*; its segments have, on the posterior margin, a narrow border of equal breadth and of a brown or reddish-brown color; upon the last segment this margin becomes indistinct, or it is altogether wanting. The blackish pubescence of the abdomen is everywhere very short and not conspicuous. The ovipositor is of the same color as the remainder of the body and is strikingly

broad; its first joint is about as long as the last three abdominal segments taken together; from its basis to the middle it is exactly as broad as the abdomen itself; beyond the middle it is but little attenuate, so that the truncature at the end has a considerable breadth; the second and third joints of the ovipositor are also rather broad; the latter does not end in a sharp point, but in a narrow truncature. Feet bare, their structure ordinary; femora unarmed; the tarsi blackish-brown from about the tip of the first joint. The yellowish-gray wings have two perpendicular whitish crossbands; the first passes between the two ordinary crossveins from the anterior to the posterior margin of the wing; the second lies between the first and the apex of the wing, but much nearer the latter, is obliterated in the marginal cell and does not entirely reach the posterior margin; besides these two whitish crossbands there is, at the end of the second basal cell and in the adjoining region of the first basal cell a small, whitish spot; the coloring of the wing, on this side of the first crossband, towards the root of the wing, changes gradually into clay-yellow, while beyond the second crossband the color is almost blackish-gray; the posterior crossvein shows the trace of a delicate blackish-gray lining, while there is no such trace on the small crossvein.

*Hab.* Texas (Belfrage).

Gen. IX. **CÆLOMETOPIA** MACQ.

*Charact.*—*Front* of moderate breadth, slightly narrowed anteriorly, somewhat excavated; ocelli far removed from the edge of the vertex, placed close to each other on a more or less projecting bump.

*Antennal arista* with a very short pubescence.

No mesothoracic and one prothoracic bristle.

*Scutellum* with four bristles; metathorax somewhat sloping.

*Femora* not incrassate, nevertheless strong, the four posterior ones considerably longer than the front pair; all are provided with spines, the fore femora, however, with a few small ones towards the tip only.

*Wings:* posterior angle of the anal cell quite obtuse; the crossveins not approximate to each other; the last section of the fourth longitudinal vein converges towards the third.

With *Cælometopia* a series of genera begins which have a comparatively short, oval abdomen, not very attenuate at the basis. The type of the genus is *C. trimaculata* Fab. = *C. ferruginea* Macq. from South America, which Wiedemann placed in the genus *Trypeta*.

1. *C. bimaculata* n. sp. ♂.—(Tab. IX, f. 27.) Rufa, abdomine chalybeo vel violaceo, pedibus flavis; tibiis tamen tarsorumque apice fuscis; alæ hyalinæ, nigro-bimaculatæ.

Ferruginous-reddish, the abdomen steel-blue or violet; feet yellow; tibiae and tip of the tarsi brown; wings hyaline with two black spots. Long. corp. 0.22—0.26; long. al. 0.21—0.22.

Head and thorax ferruginous-red, rather shining; only the hind coxæ sometimes pitch-brown. Front of very moderate breadth; narrower anteriorly, somewhat excavated; the bristles on the vertex, the very much advanced lateral bristles and the two bristles near the ocelli black and rather strong. The ocelli are placed close to each other on a flattened elevation, almost in the middle of the front; the frontal lunule is rather isolated from the face, in consequence of the very approximate position of the antennæ. The third antennal joint is sometimes more brownish-red towards the tip; arista with a short pubescence. The short hairs on the thoracic dorsum are whitish, and hence easily perceptible; the ordinary bristles are black or brown, sometimes only brownish; a blackish line in the middle is only occasionally perceptible. Scutellum convex, with four brownish or brown bristles. Abdomen metallic steel-blue, shining, with more or less extensive and vivid violet reflections; sometimes ferruginous-brownish at the extreme basis; its almost whitish pubescence appears much darker, when looked at against the light. Femora yellowish, usually brownish at the tip; the foremost ones strong, with a few weak and small spines on the under side, near the tip only; the four posterior femora much longer, also strong, with spines on the under side. Tibiæ brown. Tarsi of a dirty-yellowish brown from about the tip of the second joint. Wings pure hyaline, with a rather sparse and coarse microscopic pubescence and with black veins; the black stigma is confluent with a moderately large, sharply limited spot, reaching as far as the third longitudinal vein; a larger, almost triangular black spot occupies the apex of the wing; it begins before the second longitudinal vein and ends midway between the third and fourth veins; moreover, in the environs of the humeral crossvein, there is a grayish-black spot, which is easily overlooked. The third longitudinal vein is very straight; the small crossvein lies in the middle of the comparatively short discal cell. The anterior basal cell is somewhat expanded at the expense of the discal cell, so

that the latter is much narrower before the small crossvein than beyond it; posterior crossvein straight, somewhat oblique; the last section of the fourth longitudinal vein strikingly long, distinctly converging towards the third longitudinal vein; posterior angle of the anal cell very obtuse.

*Hab.* Cuba (Gundlach).

Gen. X. **HEMIXANTHA** nov. gen.

*Charact.*—*Front* of medium breadth, somewhat narrower anteriorly, not excavated; the posterior ocelli not very far from the edge of the vertex; the anterior one removed to about the middle of the front.

*Antennal arista* with a distinct pubescence.

A small prothoracic, and, as it seems, no mesothoracic bristle.

*Scutellum* with four bristles; *metathorax* perpendicular.

*Femora* not incrassate, but rather strong; the posterior ones longer than the foremost ones; all are beset with spines; the spines of the foremost ones are but very few.

*Wings*: posterior angle of the anal cell obtuse; crossveins conspicuously approximate; the last section of the fourth longitudinal vein is parallel to the third.

The difference from *Cœlometopia* consists principally in the peculiar position of the ocelli, the remarkably approximate crossveins and the parallelism of the third and fourth longitudinal veins.

I do not know of any described species of this genus and for this reason give the following:—

1. *H. spinipes* n. sp. ♀.—(Tab. IX, f. 28.) Lutea, metanoto epimerisque metathoracis nigris, abdomine chalybeo, violaceo-splendente; alæ subhyalinæ, apice fasciisque tribus fusco-nigris; harum secundâ posticæ, tertiâ antice, abbreviatâ.

Clay-yellow, metanotum and epimera of the metathorax black, abdomen steel-blue, with a violet reflection; wings rather hyaline, the apex and three crossbands brownish-black; the second of these abbreviated posteriorly, the third anteriorly. Long. corp. 0.24; long. al. 0.23.

Clay-yellow, thoracic dorsum more yellowish-red. Front of medium breadth, but little narrower anteriorly, not excavated, with but a small depression on the vertex; the two posterior ocelli are placed upon a very small black spot, at a moderate distance from the vertex and close to each other; the anterior ocellus is quite unusually distant from them, and placed about

the middle of the front; the bristles on the vertex, the rather distant lateral bristles and the two ocellar bristles comparatively long and strong, black. Antennæ reaching down to the border of the mouth; the comparatively long third joint sometimes somewhat infuscated at the tip. Arista pubescent. The pubescence of the thoracic dorsum is pale-yellowish, the ordinary bristles black. Scutellum of a pure yellow, with four black bristles; its surface rather even. The middle portion of the mesonotum, the lower portion of its sides and the epimera of the metathorax brownish-black. The pubescence of the pleuræ yellowish. Abdomen elongate-oval, clay-yellow at the extreme basis, the remainder shining steel-blue with violet reflections, more greenish-blue at the posterior end. The first segment of the ovipositor large, shining black, concave above, somewhat convex below. Feet clay-yellow, the basis of the middle tibiæ and the hind tibiæ brown; the tip of the tarsi but little infuscated; femora not incrassate, although rather strong, the four posterior ones longer than the two foremost ones; the latter with a few small spines near the tip only, the former beset with spines on the whole second half of the under side. Wings almost hyaline, with a yellowish-gray tinge, which is more yellow towards the anterior border; costal cell yellowish-brown; a narrow brownish-black band runs from the humeral crossvein to the axillary incision; a second one, somewhat broader, runs from the anterior margin over the basis of the submarginal cell and over the end of the small basal cells nearly, but not quite, to the posterior margin of the wing; a third band, inclosing the two remarkably approximate crossveins, extends from the posterior margin to the middle of the submarginal cell; the apex of the wing bears a large elongate brownish-black spot, beginning before the second longitudinal vein and occupying the border of the wing as far as beyond the fourth vein. The last section of the fourth longitudinal vein is parallel to the third vein; the posterior angle of the anal cell is obtuse; the microscopic pubescence of the surface of the wing is remarkably coarse and sparse.

*Hab.* Brazil.

Gen. XI. **MELANOLOMA** nov. gen.

*Charact.*—*Front* rather broad, somewhat narrower anteriorly, not excavated; the posterior ocelli not far removed from the edge of the vertex; the anterior one at a considerable distance from them.

*Antennal arista* bare.

A strong mesothoracic bristle and a very weak prothoracic one.

*Scutellum* with four bristles; *metathorax* rather perpendicular.

*Femora* not incrassate, only the hindmost ones with spines near the tip.

*Wings*: posterior angle of the anal cell quite obtuse; the crossveins not approximate; the last section of the fourth longitudinal vein parallel to the third.

The species of this genus are distinguished by their robust thorax and short oval abdomen; the surface of the latter is not smooth, but entirely covered by shallow scars, almost chagreened. The picture of the wings of the species known to me consists of a black border of the anterior margin of the wing and of the apex, and of a narrow black streak over the small crossvein.

The typical species is a Brazilian one, described by Wiedemann as *Trypeta cyanogaster*. As, in Wiedemann's description, the plastic characters are not sufficiently taken notice of, I will give the description of a species closely related to his.

**1. *M. affinis* n. sp.** ♂.—(Tab. IX, f. 29.) *Rufa*, tibiis concoloribus, posticis tamen basim versus infuscatiss, abdomine ex violaceo chalybeo; alæ hyalinæ, costâ cum apice et venâ transversâ mediâ anguste nigrolimbatis.

Red, the tibiæ of the same color, the hindmost ones infuscated towards the basis; abdomen violet steel-blue; wings hyaline, anterior margin and apex, as well as the small crossvein, with a narrow black border. Long. corp. 0.24; long. al. 0.24.

Ferruginous-red, shining; abdomen of a dark steel-blue color, somewhat verging on violet. Front rather broad, somewhat narrower anteriorly, sometimes tinged with yellow on the sides; the short and thin hairs upon it are inserted in small, very shallow, and hence hardly perceptible pits. The two superior ocelli are quite near the vertex; the anterior one is quite a distance from them, but still above the middle of the front; bristles of the vertex, the lateral ones and the two bristles near the ocelli, are present. Antennæ reaching a little beyond the border of the mouth; the third joint long, sometimes more reddish-brown.

Arista thin and apparently bare. Thorax strongly built; the fallow-yellowish pubescence of its dorsum very short; the ordinary bristles black. Scutellum convex, with four bristles. The perpendicular mesonotum, the pleuræ and the pectus of the same color as the upper side of the thorax. The mesothoracic bristle strong, black, and hence very conspicuous; the prothoracic bristle thin and fallow-yellowish, and hence easily overlooked. The metallic-blue abdomen is of a rounded-oval shape and is covered with shallow scars, which diminish its lustre; its short pubescence is whitish on the first segment only, otherwise rather blackish. Feet of a yellowish-ferruginous color, only the distinctly arcuate hind tibiæ are gradually infuscated towards the basis; the tarsi, beyond the second joint, are more or less ferruginous-brownish. Femora not incrassate, only the hindmost ones with spines near the tip. Wings hyaline; the costal cell, the stigma, and a narrow border, running from it to the fourth longitudinal vein, along the margin of the wing, black; the small crossvein likewise with a narrow black cloud; a blackish spot lies between the extreme basis of the submarginal cell and the end of the costal cell. The second longitudinal vein reaches the anterior margin rather far from the apex of the wing; the third longitudinal vein is very straight; the small crossvein is a little beyond the middle of the discal cell, which is considerably narrower before this crossvein than after it; posterior crossvein straight, a little oblique; the last section of the fourth longitudinal vein rather long, parallel to the third vein; posterior angle of the anal cell quite obtuse. The microscopic pubescence of the surface of the wing is comparatively sparse and coarse.

*Hab.* Brazil.

*Observation.*—*M. cyanogaster* Wied. is not quite as large as the above-described species; its wings are comparatively smaller and the black border along the costa is somewhat broader at the apex of the wing; the lateral bristle of the front is somewhat more removed from the bristles on the vertex; the shallow pits on the front are not perceptible; the pubescence of the thoracic dorsum is considerably longer; the pleuræ and the tibiæ are blackish-brown.

Gen. XII. **EPIPLATEA** Loew.

*Charact.*—*Front* broad, narrower anteriorly; not projecting in profile; rather densely hairy upon the whole surface.

*Antennæ* of medium size; third joint oval, with a thin, bare arista.

*Face* vertical, with a depression under each antenna; longitudinally convex between these depressions; *clypeus* of a moderate transverse diameter, projecting considerably beyond the anterior edge of the mouth, which is drawn upwards; *proboscis* stout.

*Thorax* with bristles on its hind part only; *scutellum* convex, with four bristles.

*Femora* of moderate length, strong, but not incrassate; all unarmed.

*Wings* comparatively short; submarginal and first posterior cells broad; third longitudinal vein bent backwards towards its end; the last section of the fourth longitudinal vein does not converge towards the third; posterior crossvein perpendicular; the posterior angle of the anal cell rather acute.

The species of this genus are rather stout, not metallic, except sometimes on the abdomen. The structure of the head recalls that of some *Sciomyzidæ*, and is very like that of the two well-known species, described by Wiedemann as *Ortalis trifasciata* and *atomaria*; in their general appearance, the species of *Epiplatea* are also not unlike the two latter species, but are easily distinguished by the first longitudinal vein being bare, by the posterior angle of the anal cell not being rounded as in those species and by the absence of the erect bristle before the end of the upper side of the tibiæ, a bristle which is always present in the latter species.

**1. *E. erosa* Loew.** ♀.—(Tab. IX, f. 24.) Fusco-testaceo vel ex ferrugine fusca, pedibus concoloribus; abdomine nigro, alis hyalinis, fasciis duabus et puncto centrali nigris.

Brownish-yellow or ferruginous-brown, with the feet of the same color and a black abdomen; wings hyaline, with two brown crossbands and in the middle with a brown dot. Long. corp. 0.17; long. al. 0.16.

SEN. *Epiplatea erosa* Loew, Berl. Ent. Zeitschr. XI, p. 325, Tab. II, f. 25.

The coloring of the lighter shaded specimens is yellow-brownish, in darker specimens it becomes ferruginous-brown. Head of the same color. Front broad, considerably narrowed anteriorly, upon its whole surface uniformly and rather densely clothed with an erect, black pubescence; along the lateral margin with a narrow border of white pollen; the stripes running down from



the vertex along the sides of the front and the ocellar triangle are of the same color as the front and hence indistinct. Antennæ not reaching quite to the edge of the mouth; the first two joints of the color of the head, or a little lighter; the oval third joint dark-brown, often quite black; the arista thin and bare. Face excavated under each antenna, longitudinally convex between these depressions; descending vertically in profile; the anterior edge of the mouth is strongly drawn upwards, so that the clypeus projects considerably above it. Proboscis stout; palpi brown, generally paler towards the tip. The thoracic dorsum generally has, on the posterior side, an almost silvery-white transverse crossband, and before the transverse suture, on each side, a large spot of a similar pollen; these pollinose spots are very distinct, when seen by reflected light, but can easily be overlooked in any other light. Upon the pleuræ likewise there are two spots of white pollen; one of them lies over the fore coxæ, the other immediately under the longitudinal suture of the pleuræ, where the color is generally darker-brown. The front part of the coxæ is likewise covered with a white pollen, which, however, sometimes is entirely invisible. Abdomen black, somewhat glossy, generally brown at the basis, with a rather coarse pubescence, which is longer and black on the posterior margins of the segments. The flattened ovipositor is somewhat attenuate, its first two segments black, the third orange-yellow. Feet of the same color as the body; tibiæ and tarsi darker brown, in fully colored individuals brownish-black. Halteres yellowish. Wings of very moderate length, rather broad, hyaline, with brown veins; the basis of the wings as far as the humeral crossvein and the anal cell are brownish; a narrow brownish-black band begins at the costa, where it is confluent with the small black stigma and a black spot, lying at the end of the costal cell; it runs over the bases of the submarginal, discal, and third posterior cells, as far as the sixth longitudinal vein, which its end alone crosses a little; before the apex of the wing there is a broader crossband, which is sinuate on both sides, weaker, however, on the inside than on the outside; posteriorly it bifurcates in two short, obtuse branches, the inner one of which reaches the margin of the wing and covers the perpendicular posterior crossvein; the outside one is shorter and ends in the second posterior cell, some distance from the margin of

the wing; between these two crossbands is the black spot, formed by a cloud over the small crossvein; the stigma is small; the small crossvein is beyond the middle of the discal cell; the submarginal and first posterior cells are broad; the end of the third longitudinal vein is gently curved posteriorly and ends exactly in the apex of the wing; the last section of the fourth longitudinal vein does not converge towards the third; the anal cell is comparatively rather small; the crossvein, closing it, is a little arcuate, but forms nevertheless a rather acute posterior angle.

*Hab.* Cuba (Gundlach).

## APPENDIX,

CONTAINING THE DESCRIPTIONS OF THE SPECIES PUBLISHED BY PREVIOUS WRITERS, AND NOT IDENTIFIED BY THE AUTHOR.

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### 1. *Say, Journ. Acad. Nat. Sciences Phil., Vol. VI, Part II.*

#### Page 83. *Ortalis ligata.*

Wings quadrifasciate with fuscous.

Inhabits Mexico.

*Body* blackish; *head* ferruginous, tinged with glaucous behind and on the vertex; *thorax* blackish-plumbeous; *wings* white, subopaque, with four fuscous bands; the first a little oblique, across the neck of the wing; second from the tips of the mediastinal and post costal nervures, and proceeding a little obliquely, so as to be bounded posteriorly by the middle cross-nervure; third, perpendicular to the costal margin and covering the posterior cross-nervure; fourth, terminal, slightly connected on the costal edge with the third; *poisers* white; *tergum* coppery-black; *feet* black; *knees* and *tarsi* ferruginous. Length three-twentieths of an inch.

[Belongs very probably to the genus *Rivellia*, but it will be difficult to decide to which species, on account of the great similitude between the species of that genus.—*Loew.*]

### 2. *Rob. Desvoidy, Myodaires.*

#### Page 715. *Meckelia philadelphia.*

Minor *M. eleganti*; pedes fulvi, tibiis nigricantibus; alæ flavescentes, unicâ maculâ subfusca.

Plus petite que la *Meckelia elegans*; frontaux, antennes, face, rouges; optiques d'un gris rougeâtre; corselet d'un brun-gris;

abdomen un peu moins gris et d'un noir plus luisant; cuisses fauves; tibiae mélangés de noir et de fauve; tarses noirs; ailes flavescentes, n'offrant que l'apparence d'une seule macule.

Originaire de Philadelphie.

(Translation.)—Smaller than *Meckelia elegans*; frontal bristles, antennæ, face, red; optical bristles of a reddish-gray; thorax brownish-gray; abdomen a little less gray and of a more shining black; femora fulvous; tibiae mixed with black and fulvous; tarsi black; wings flavescent, with the appearance of a single spot.

From Philadelphia.

[It seems hardly doubtful that this species belongs to the *Ortalina*; it is probably either an *Anacampta* or a *Ceroxys*, as Rob. Devoidy's genus *Meckelia* has the third antennal joint excised on the upper side and ending in a very sharp angle.—*Loew*.]

### 3. Walker, *Insecta Saundersiana*.

Page 373. *Ortalis basalis*, Mas. et Fœm.

Nigro-cyanea, caput fulvum; antennæ luteæ; abdomen basi ferrugineum, *fœm.* apice luteum attenuatum; pedes fulvi; alæ hyalinæ, basi fulvæ, vitta antica interrupta fusca.

*Ceroxys*? Blackish-blue: head tawny; face with a whitish covering; epistoma prominent; mouth pitchy; feelers luteous; third joint much deeper than the second and more than twice its length; sixth black, bare, very slender, more than twice the length of the third; abdomen longer than the chest, ferruginous towards the base; abdomen of the female pale luteous towards the tip, which is much attenuated; legs tawny; wings colorless, slightly tawny at the base, adorned along the fore border with a dark-brown interrupted stripe, which is widened at the tip; veins black; fifth vein converging towards the tip of the fourth; sixth not reaching the hind border; crossveins straight, almost upright; poisers pitchy. Length of the body  $1\frac{1}{2}$ —2 lines; of the wings 2—3 lines. United States.

[It is utterly improbable that this species should be a *Ceroxys*, as Mr. Walker supposes; his description rather suggests that it belongs to the *Ulidina*.—*Loew*.]

4. *Macquart, Dipt. Exot. II, III, Tab. XXIX. fig. 3.*Page 208. ***Herina mexicana.***

Viridi-cyanea. Alis limbo externo nervisque transversis fuscis.

Long. 4 lin.—Face testacée. Front noir; vertex et derrière de la tête testacés. Antennes brunes; style fauve. Thorax d'un vert brillant, à reflets bleus. Abdomen manque. Pieds noirs. Ailes jaunâtres jusqu'à l'extrémité; cellules basilaires brunes; nervures transversales bordées de brun; première oblique.

Du Mexique.

(Translation.)—Length 4 lines. Face testaceous; front black; vertex and occiput testaceous. Antennæ brown; arista fulvous. Thorax of a brilliant green, with blue reflexions. Abdomen—(wanting). Feet black. Wings yellowish, anterior margin brown from the stigmal cell, inclusively, as far as the apex; basal cells brown; crossveins bordered with brown; the first of them oblique.

Mexico.

[Macquart very improperly placed this species in the genus *Herina*; it is a perfectly normal species of his own genus *Stenopterna*.—Loew.]

5. *Walker, List of Dipt. Ins. IV.*Page 992. ***Ortalis massyla*, n. sp., Fem.**

Viridis, capite ferrugineo, abdominis segmento quinto purpureo apice fulvo, palpis ferrugineis, antennis pedibusque nigris, tarsis fulvis, alis albis fusco trifasciatis.

Body metallic-green, slender, clothed with short black hairs: head and chest beset with black bristles: head ferruginous above and along the borders of the eyes; epistoma ferruginous, prominent, eyes red; fore part slightly convex; its facets a little larger than those elsewhere: sucker black, clothed with tawny hairs; palpi ferruginous; beset with black bristles: feelers black, much shorter than the face; third joint conical, ferruginous at the base, much longer than the second; bristle bare, very slender, more than thrice the length of the third joint; abdomen long-obconical, much longer than the chest, tapering, flat, and with a vein on each side towards the tip, which is tawny; fifth segment dark-purple: legs black, clothed with short black hairs; knees ferruginous; feet and tips of shanks dull tawny: wings white, with

three dark-brown bands; the first extends nearly to the hind border, and joins the side of the middle crossvein; the second reaches the hind border and incloses the lower crossvein; it is darkest on the fore border, and there unites with the third, which widens along the fore border and occupies the whole of the tip of the wing; wing-ribs, veins, and poisers tawny; veins pitchy in the brown parts of the wings; lower crossvein nearly straight. Length of the body  $1\frac{3}{4}$ —2 lines; of the wings 3—4 lines.

North America.

[This seems to be an *Euxesta*.—Loew.]

#### 6. Walker, List of Dipt. Ins. IV.

Page 995. *Orthalis? diopsides*, BARNSTON'S MSS. Fem.

Nigra, obscura, capite antico fulvo, palpis antennis pedibusque piceo-ferrugineis, alis subcinereis ad costam fusco bimaculatis.

Body dull-black, clothed with very short black hairs: head beset with a few black bristles, tawny in front and beneath, where it is covered with white bloom; sides of the face without bristles; epistoma slightly prominent; eyes dark-red; facets of the fore part a little larger than those elsewhere: sucker and palpi ferruginous, partly pitchy; sucker clothed with tawny hairs; palpi beset with black bristles; feelers ferruginous, shorter than the face; third joint pitchy above, nearly round, longer than the second joint; bristle black, bare, slender, much more than twice the length of the third joint; abdomen spindle-shaped, much longer than the chest; last segment flat: legs pitchy, mostly ferruginous beneath, clothed with very short black hairs; claws black: wings slightly gray, with a narrow pitchy band at half the length of the fore border, on which, near the tip, there is a small brown spot; wing-ribs tawny; veins black, tawny at the base; longitudinal veins straight; lower crossvein straight, slightly oblique, nearly twice its length distant from the middle crossvein; poisers pale tawny. Length of the body 2 lines; of the wings  $2\frac{1}{4}$  lines.

St. Martin's Falls, Albany River, Hudson's Bay.

[This species seems likewise to belong to the *Ulidina*, a group which is so abundantly represented in America.—Loew.]

7. Walker, *List of Dipt. Ins.* IV.Page 995. *Ortalis? costalis*, n. s., Fem.

Nigra, abdomine nigro-seneo, pedibus nigris, alis limpidis ad costam fusco bimaculatis, stigmatibus nigris.

Head wanting: chest dull black, beset with a very few black bristles: abdomen sessile, brassy-black, shining, slightly spindle-shaped, much longer but hardly broader than the chest: legs black, clothed with very short black hairs: wings colorless, with a small brown spot just above the tip, and another at the base of the fore border, where the vein is thickened; a black band along the middle of the fore border; wing-ribs and veins black; third longitudinal vein straight, with the exception of a very slight angle at its junction with the lower crossvein, which has two very slight curves, the upper inward, the lower outward. Length of the body  $1\frac{1}{2}$  line; of the wings  $3\frac{1}{2}$  lines.

St. Martin's Falls, Albany River, Hudson's Bay.

[In this description, after the words "third longitudinal vein straight," something seems to be wanting, as this vein does not at all meet the posterior crossvein. The species very likely also belongs to the *Ulidina*.—Loew.]

8. Macquart, *Dipt. Exot. Suppl.* IV, Tab. XXVI, fig. 17.Page 289. *Urophora antillarum*.

Viridi-nigra. Fronte testacea, alis fasciis duabus, apiceque fuscis.

Long.  $1\frac{1}{2}$  lin. ♂.—Palpes noirs. Face d'un vert noirâtre luisant, à léger duvet blanc sur les côtés. Front testacé; une tache verte sur le vertex. Antennes noirs. Thorax et abdomen d'un vert luisant noirâtre. Pieds noirs; premier article des tarses testacé. Ailes claires, à base jaunâtre; une première bande passant sur la première nervure transversale, et n'atteignant pas le bord intérieur; la deuxième entière, passant sur la deuxième transversale; extrémité à tache brune, liée à la deuxième bande par le bord extérieur également brun.

Des Antilles.

[Almost undoubtedly an *Ulidina*.—Loew.]

9. *Bigot, Ramon de la Sagra, Hist. fis. d. l. Isla da Cuba.****Ulidia fulvifrons.***

Nigro-piceo-nitens, hypostomate nigro; fronte, oculis, antennisque fulvis, occipite brunnea; thorace nigro-nitente; abdomine nigro-piceo; pedibus fulvis; anticis, cruribus antice brunnescens; tibiis tarsisque brunneis; intermediis posticisque, femoribus basi, brunneis; tibiis postice brunneis; alis hyalinis; costa brunnea, punctoque apicali nigro.—Long. 4 mill.

[This species may belong to the *Ulidina*, but it is not probable that it is a true *Ulidia*. The *Ulidia metallica* Bigot, described in the same place, is not an *Ortalida* at all, but belongs to the *Agromyzidæ*, perhaps to the genus *Agromyza*.—Loew.]

10. *Walker, Trans. of the Ent. Soc., Tom. V. 1861.*Page 326. ***Ortalis bipars.***

Nigricante viridis, capite supra antennisque rufis, harum articulo tertio longo lineari, pedibus nigris, alis albis nigro-trifasciatis et apice maculatis, vittis secundâ tertiâque postice obsoletis, primâ incompletâ, halteribus pallidis.

Blackish-green: head above and antennæ red; third joint of the antennæ long, linear; wings white, with three slight black bands and an apical spot, first band very incomplete; second and third obsolete hindward; discal transverse vein straight, upright, parted by one-fourth of its length from the border and by much more than its length from the brachial transverse vein; halteres pale.

Length of the body  $2\frac{1}{2}$  lines; of the wings 4 lines.

United States.

11. *Walker, Trans. of the Ent. Soc., Tom. V. 1861.*Page 324. ***Bricinnia.***

Corpus longiusculum, sat angustum. Peristoma magnum. Antennarum articulus tertius longus, gracilis, linearis; arista simplex, gracilis. Thorax longus, lateribus compressis. Abdomen longum, subfusiforme, apice attenuatum. Pedes validi. Alæ sat angustæ, venis rectis.

Fœm. Oviductus vaginæ productæ, gracilis.



Body rather long and narrow. Epistoma rather prominent; mouth large; third joint of the antennæ long, slender, linear, extending to the epistoma; arista slender, simple, nearly twice the length of the third joint. Thorax long, compressed on each side. Abdomen long, subfusiform, attenuated towards the tip. Legs stout, moderately long. Wing rather narrow; veins straight.

Female. Abdomen attenuated at the tip. Vagina of the oviduct slender, produced.

***Bricinnia flexivitta* Fem.**

Nigra, capite apud oculos albo, vittâ anticâ albidâ, antennis ferrugineis basi fulvis, thorace vittis tribus albidis, pectore purpureo-cyaneo, abdomine cupreo, femoribus posticis basi flavis, tarsis fulvis, alis sub-cinereis, costâ apiceque luridis, vittâ discali angulatâ nigrâ, venâ discali transversâ vix arcuata.

Female. Black: head white about the eyes and with a whitish facial stripe, which is dilated towards the epistoma; antennæ ferruginous, tawny towards the base; thorax with three whitish stripes; pectus blue, varied with purple; abdomen cupreous; vagina of the oviduct attenuated; hind femora yellow towards the base; tarsi tawny; wings grayish, lurid along the costa and at the tips, and with a blackish stripe which extends from the base to and along the discal transverse vein; the latter is upright and hardly curved, and is parted by four times its length from the border, and by a little less than its length from the præbrachial transverse vein, which is oblique.

Length of the body 5 lines; of the wings 10 lines.

Mexico.



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# REVIEW

OF THE

## NORTH AMERICAN TRYPETINA.

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### INTRODUCTION.

IN 1860, at the time of the publication of my paper on the *Trypetidae*, contained in the first volume of these Monographs, only twenty-three North American species of this family were known. Since then, this number has reached sixty-one. Among these additions there is a number of species of previous authors, concerning which I did not possess sufficient information at the time of my earlier essay. Moreover, a number of species published by Wiedemann became accessible to me in type specimens, through the kindness of the Berlin and Vienna Museums. Since that time, also, several other authors have published new species belonging to the same group. And, finally, the systematic distribution of the group *Trypetina* has obtained, for the European species, a more solid foundation.

It would seem to be time, therefore, to undertake an entirely new work on the *Trypetina* of North America ; but as the plan of the present series does not well admit of it, I have adopted the form of a supplement to my previous paper. One of the principal aims of the present essay will be, the adaptation to the American fauna, as far as it is possible, of the systematic distribution introduced among the *Trypetina* of the old continent. While I was engaged on Monographs, etc., Part I, the number of the North American species with which I was acquainted, was, as yet, too insignificant for an attempt at a subdivision in smaller groups ; besides, similar attempts, undertaken for the European species

by other authors (an account of them may be found in Monographs, etc., Part I, p. 49-51), seemed to me so ill conceived, that I did not feel inclined to adopt them as a basis for further development. I perceived, on the contrary, that any attempt to subdivide exotic Trypetidæ must be preceded by a rational systematic distribution of the more abundant material of the European species. In 1862, in my monograph of the European Trypetidæ, I divided the Trypetina into twenty subgenera: *Platyparea*, *Euphranta*, *Aciura*, *Hemilea*, *Anomæa*, *Acidia*, *Spilographa*, *Zonosema*, *Rhagoletis*, *Rhacochlæna*, *Trypeta*, *Ensisina*, *Myopites*, *Urophora*, *Sphenella*, *Carphotricha*, *Oxyphora*, *Oxyna*, *Tephritis*, and *Urellia*. The definitions of these groups will be found in the above-quoted work. To these must be added: *Hypenidium* (established by me since, in the *Berliner Entom. Zeitschr.*, VI, p. 87), *Orellia* (separated by Schiner, in his *Fauna Austriaca*, from *Oedaspis*) and *Chetostoma* (established by Rondani, in his *Prodromus*, Vol. I). Such is the present state of the classification of the European Trypetina, upon which the distribution of the known North American species is to be based. Considerable as the number of the latter is, it is certain at the same time that this number does not reach one-fifth, perhaps not one-tenth, of all the existing North American Trypetina. Any attempt at a distribution, therefore, would probably be modified by further discoveries. In this dilemma, the course I adopted was, to append to the description of each species the necessary remarks on its systematic position, and to give a general survey of all the results thus obtained, at the end of the volume.

Detailed descriptions of those species only are given here, which are not described in Monographs, etc., Part I, or the descriptions of which were insufficient. The descriptions contained in that volume are indicated by references; the diagnoses, however, even of those older species are reproduced here, with the modifications rendered necessary by the addition of the new species.

An important defect of the present publication is, that a considerable number of the new species are not represented on the plates. The reason is, that the plates were prepared more than four years ago, at a time when the number of the known North American species was not sufficient to fill the required number

of figures. This was done by the addition of a number of South American species, described for the sake of comparison, but the figures of which I would have preferred now to replace by those species from North America, which I received after the plates were printed.

The critical examination of the species described by other authors, appended to the first volume, p. 57-61, required several corrections and additions. I have, therefore, reproduced it, thus amended, at the end of the present volume, as Appendix I. Appendix II contains descriptions, by other authors, of species not known by me and not contained in Part I.

The materials for the present publication, as far as the North American species are concerned, are principally, almost exclusively, derived from the communications of Baron Osten-Sacken. If I had had a similar support from more than one side, my work might, of course, have been more complete and more perfect. As it is, I have been compelled to draw the descriptions of several species from single, often badly preserved, specimens, and I am afraid that these descriptions, as well as the opinions expressed by me on the systematic position of some species, may sometimes betray the incompleteness of my materials. I trust that an equitable critic will bear these circumstances in mind in framing his appreciations.

H. LOEW.

Guben, August, 1873.

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<sup>1</sup> The species from South America, described for the sake of comparison with North American species, are printed in smaller type and not numbered in this list.

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## DESCRIPTION OF THE SPECIES.

1. *T. eximia* WIED. ♂ ♀.—Lutea, abdomine nigro-fasciato; scutellum magnum, planum, setis sex validis instructum; alarum pictura fusca inde a basi maculis irregularibus variegata ad ultimum usque trientem pertinet, ubi vittam costalem et fasciam a margine antico ad posticum oblique ductam emittit; præterea in margine antico duæ maculæ triangulæ et hyalinæ, in postico duæ subovatæ et subhyalinæ conspiciuntur, ad quas in speciminibus plerisque macula rotunda hyalina in cellula discoidalis basi sita accedit.

Clay-yellow, abdomen banded with black; scutellum large, flat, with six strong bristles; the brownish-black coloring of the wings reaches from the irregularly spotted basis to the last third of the wing, where it emits two bands, one of which forms a border along the costa, the other runs obliquely from the anterior to the posterior margin; moreover, the anterior margin shows two triangular hyaline spots, the posterior margin two almost oval and less hyaline spots; most specimens have, besides, a round hyaline spot on the basis of the discal cell. Long. corp. 0.26—0.28, ♀ cum terebrâ 0.29—0.30; long. al. 0.25—0.26.

SYN. *Trypeta eximia* WIED. Zweifl. Ins. II, p. 477, 2.

*Tephritis fasciventris* MACQ. Dipt. Exot. Suppl. IV, p. 291. Tab. XXVII, f. 3.

Clay-yellow; head of a somewhat purer yellow, rather disciform. Front narrow, still more narrowed anteriorly, with a small, but well-defined frontal lunule. Frontal and vertical bristles black, rather long and strong; the upper half of the posterior orbit of the eyes with a row of black and blackish-brown bristles. Antennæ clay-yellowish, third joint elongated, rounded at the tip; arista very slender, with a hardly perceptible pubescence. Face perpendicular; the edge of the mouth not upturned; palpi yellowish, broad, reaching as far as the anterior edge of the mouth; their pubescence, as well as that of the mentum and of the occiput, is yellow. Thorax rather strongly built, comparatively broad between the roots of the wings; the humeral callus and a longitudinal stripe between it and the root of the wing, are yellowish-white or sulphur-yellow; a longitudinal stripe of a similar color, which is generally but little visible in dried speci-

mens, runs from the posterior corner of the thoracic dorsum to the transverse suture; in some specimens the posterior border of the thoracic dorsum also shows a trace of a lighter coloring; the dense, but very short, pubescence of the thoracic dorsum is yellowish; the macrochætæ upon it are black; there are seven of them on each side, viz.: three on each side, in a row beginning at the humerus and ending before the root of the wings; three others a little farther from the lateral margin in a row beginning at the transverse suture and ending in the vicinity of the posterior corner; finally, a single bristle between the last one of this second row and the lateral corner of the scutellum; there are only two pairs of macrochætæ on the longitudinally middle portion of the thoracic dorsum, not far from the posterior margin; the bristles of the posterior pair are at a moderate distance from each other, the distance between those of the anterior pair is perhaps three times greater. All the bristles and bristle-like hairs upon the pleuræ and the pectus are black; the short pubescence upon the upper half of the pleuræ is blackish, on the lower half it is pale-yellow. Scutellum comparatively large, flat, with a short, yellowish pubescence on the upper side, and with six strong macrochætæ along the edge; in life, the scutellum is probably altogether whitish-yellow or sulphur-yellow, while in dry specimens, this coloring is perceptible along the borders only. The abdomen has brownish-black bands, which do not reach the posterior margin of the segments; these bands occur upon the second, third, and fourth segments; they are often less developed upon the anterior segments than upon the posterior ones, and here sometimes interrupted; upon the rather large last abdominal segment of the male the brownish-black crossband is especially broad and more or less emarginate on its posterior side; my only female specimen has on the first abdominal segment an incompletely developed brownish-black band, situate before the posterior margin. The pile upon the abdomen is black; pale-yellowish on the upper side of the first segment and sometimes also on the basis of the second; however, all the pile upon the abdomen assumes, in a reflected light, and especially in specimens of a lighter coloring, a brownish-yellow, almost a ferruginous-yellow tinge (with the exception of the stronger, bristle-like hairs). The hypopygium is brownish-black; the brown ovipositor is conical, not flattened at all, perceptibly longer than the last

two segments taken together, but shorter than the last three. Its pile is brownish-yellow or brown, the color of the rather long bristle-like hairs on the end of the first segment is dark-brown or black. Feet clay-yellow; front femora on the upper side with short, on the under side with more elongate black bristles; front tibiae not bristly; middle femora at the end of the posterior side with a few bristles and, also, on the under side, with two longitudinal rows of short black bristles, which are more developed in the male than in the female; middle tibiae with a single row of bristles; hind femora, at the end of the upper side with elongated bristles, with shorter ones on the under side; hind tibiae with bristle-like cilia. Tegulae more than usually developed. Wings rather large and broad; the first longitudinal vein altogether beset with bristles, the third far beyond the small crossvein, the fifth upon the first and upon the beginning of its second section, bristly; the second longitudinal vein ends in the costa at an acute angle, and diverges very strongly from the third, the latter is not bent anteriorly at its end; crossveins rather approximate, the small one perpendicular and of a comparatively considerable length; the posterior one very steep and somewhat curved towards its posterior end; posterior angle of the anal cell drawn out in a rather long lobe. The brownish-black, sometimes almost black picture of the wings, is recognizable in Macquart's above-quoted figure, although not correctly rendered; the round pale spot in the discal cell should be much nearer to its basis; the pale indentation at the posterior margin, near the basis of the wing, should be much narrower; the stigma should be placed entirely in the dark portion of the coloring; the hyaline double spot near the anterior margin is seldom merely emarginate posteriorly; in most cases it is divided in two approximate triangular spots; other differences in the picture likewise occur; the most common is, that in the discal cell, a little beyond the small crossvein, there is a short, pale streak, crossing the cell, and which in some cases becomes a hyaline transverse spot. A male from Brazil in my collection has, instead of the round pale spot in the discal cell, only a somewhat paler place without any distinct outline; the agreement in the other characters being perfect, I take it for a rather unusual variety of *T. eximia*.

*Hab.* Brazil, especially Bahia and St. Paulo; Surinam; Mexico.



*Observation 1.*—Mr. Macquart, in the above quoted place, supposes that his *Tephritis fasciventris* may be only a variety of the *Tephritis major*, Dipt. Exot. Suppl. II, p. 93, Tab. VI, f. 6. However, this *Tephritis major* is identical with *Tephritis socialis* Wied., a species which is very distinct from *fasciventris* Macq. (syn. *eximia* Wied.).

*Observation 2.*—I have gone into more detail about the plastic characters of this species than was strictly necessary for its specific identification. I did so on account of the great resemblance in the plastic characters of *T. eximia* with *T. amabilis*, with *T. socialis* Wied., and with several other South American species. These species form a very well-defined group, for which I choose the name of *Hexachæta*, and which deserves to be considered as a separate genus. The generic character may be derived from what has been said, in the above description of *Trypeta eximia*, concerning the shape of the head and of its parts, the shape of the thorax and of the scutellum, the number and position of their macrochætæ, the bristles on the feet, as well as concerning the bristles on the wing-veins. The body and the picture of the wings of all the species of *Hexachæta* are strikingly uniform. I know of no other but American species of this group.

**2. *T. amabilis* n. sp. ♂.**—Lutea, thoracis dorsum sulphureo-vittatum, postice nigricans; pleuræ fusco-nigræ, sulfureo-vittatæ; scutellum magnum, planum, setis sex validis instructum, nigrum, late sulfureo-marginatum; abdomen fasciis tribus interruptis nigris ornatum; femora intermedia magnâ ex parte, postica fere tota nigra; alarum pictura fusco-nigra, præter maculam ingentem, quæ in mediâ alæ locum habet et totam ejus latitudinem explet, fasciam angustam subperpendicularem, quâ vena transversalis posterior includitur, et vittam costalem inde ab hac fasciâ usque ad summam alæ apicem pertinentem ostendit.

Clay-yellowish, thoracic dorsum with sulphur-yellow longitudinal stripes, blackish along the posterior margin; pleuræ brownish-black with sulphur-yellow longitudinal stripes; scutellum large, flat, with six macrochætæ, black, with a broad yellow border; abdomen with three interrupted black crossbands; intermediate femora partly, hind femora almost entirely brownish-black; the brownish-black picture of the wings shows, besides an unusually large spot upon the middle of the wing, occupying its whole breadth, a narrow, almost perpendicular crossband, covering the posterior crossvein, and from which a border extends along the costa as far as the apex of the wings. Long. corp. 0.26; long. al. 0.28.

Of the size of *T. eximia* Wied., and so closely allied to it in all the plastic characters, that their detailed description would be superfluous. Head and all its parts of the same coloring and the same structure as in that species, only the frontal bristles are somewhat weaker. The thoracic dorsum shows a delicate middle line, gradually fading anteriorly and expanding posteriorly into a large spot, which does not entirely reach the posterior thoracic margin, and is surrounded laterally and posteriorly by a blackish coloring; beginning at the shoulder, a sulphur-yellow stripe runs, gradually expanding, to the root of the wing; it emits, near the humeral callus, an upper branch, running towards the transverse suture; between both branches, the color changes into brownish. Pleuræ brownish-black, with a sulphur-yellow longitudinal stripe across the middle; moreover, the sulphur-yellow stripe between the humerus and the root of the wings, is prolonged under the latter as far as the posterior end of the thorax. Scutellum entirely of the same structure as in *T. eximia*, sulphur-yellow, at the basis of the upper side with a large, semicircular brownish-black spot, the border of the upper side only remaining sulphur-yellow. Metathorax brownish-black, spotted with brown on the sides, and with a yellow spot on the middle of its upper side. The dense and very short pubescence of the thorax and the scutellum is more whitish-yellow than is usually the case in *T. eximia*; otherwise the hairs and bristles of both species are alike in their coloring; the number and position of the macrochætæ is the same in both. Abdomen with three very broad black cross-bands, which lie on the second, third, and fourth segments, and leave uncovered only the middle line and the posterior margin of these segments. The pile on the abdomen is black; on the upper side of the first segment and along the posterior border of the second, pale-yellowish. Hypopygium brownish-black. Coxæ and feet yellow; the intermediate femora towards the basis, to a great, but variable extent, brownish-black; hind femora black, somewhat yellow towards the end, especially on the under side. The bristles on the femora and tibiæ are almost as in *T. eximia*. The shape of the wings, the venation, and the position of the bristles are exactly as in that species; the pattern of the picture is likewise a somewhat similar one; however, it differs considerably in the details; the bulk of the dark coloring extends a little beyond the small crossvein and is gently

rounded off, the curve formed by it striking the anterior margin nearly at a right, the posterior margin at an acute angle; the latter margin, however, is not quite reached, as a narrow hyaline space remains between it and the dark coloring; this curve would have been a perfect one, were it not for a small projection before the posterior crossvein and for a small excision immediately beyond it; near the anterior margin, the dark-brown coloring, immediately before its end, is interrupted by a triangular hyaline indentation, the tip of which reaches the third longitudinal vein immediately before the small crossvein; the distal side is concave, the proximal side is straight and perpendicular to the costa. The brown coloring has no distinct limit towards the base of the wing; it gradually dissolves into a system of irregular spots; the costal cell is hyaline, with the exception of a brown infuscation along the costa between the humeral crossvein and the auxiliary vein; likewise hyaline are the extreme basis of the marginal cell and the entire second basal cell with the exception of a very narrow brownish-black border along the veins inclosing it; the first basal cell at its root, as far as the humeral crossvein, is also rather hyaline; beyond this, for an almost equal distance, it is yellowish; the anal cell is of a dirty yellow, blackish-brown towards its end, which color also extends over the basis of the third posterior cell; alula, posterior angle of the wing, and the portion of the third posterior cell lying alongside of it, are hyaline; moreover, in the third posterior cell, quite near its basis, at the place where it is contiguous to the second basal cell, there is an elliptical hyaline drop; in the first basal cell, below the beginning of the third longitudinal vein, there is a longitudinal spot of a dirty ferruginous color; a somewhat larger spot of the same coloring is in the marginal cell, below the place, where the auxiliary vein diverges from the first longitudinal. The hyaline apical portion of the wing shows a narrow crossband, covering the posterior crossvein, almost perpendicular, very gently curved, of a brownish-black color; its anterior end turns towards the costa in the shape of a bow and follows it afterwards as a narrow border, as far as the tip of the fourth longitudinal vein.

*Hab.* Mexico (collection of Mr. v. Roeder).

3. *T. suspensa* Lw. ♂. (Tab. X, f. 5).—Tota lutea, alarum rivulis fuscans, cellulâ basali secundâ et cellulâ discoidalis basi non hyalinis, apice venæ longitudinalis quartæ recurvo.

Altogether clay-yellow, rivulets of the wings infuscated; second basal cell and root of discal cell not hyaline, the tip of the fourth longitudinal vein curved forward. Long. corp. 0.21; long. al. 0.22—0.23.

SYN. *Trypeta suspensa* Loew, Monogr., etc., I, 69. Tab. II, f. 5.

The present species begins a group of very closely allied species, very much resembling one another. I have nothing to add to my above-quoted description of *T. suspensa*; I will only notice that the absence of pale yellow stripes on the thorax and of a pale yellow coloring of the scutellum cannot be considered as absolutely distinctive of this species, as these marks often disappear in other species in the process of drying. The readiest distinctive mark between *T. suspensa* and the very similar, but larger *T. fraterculus* is, that in the former, the second basal cell and the root of the discal cell have a yellowish color, while in the latter they are hyaline. I regret to have to notice here, that the engraver, in figuring *T. suspensa*, has committed an error in drawing the curvature of the tip of the fourth vein; this curvature is exactly similar to that in *T. fraterculus*, that is, running forward; and although this curved tip in *T. suspensa* is a little shorter, the difference is not at all such as the figure would lead one to suppose. The second basal cell and the basis of the discal cell should be somewhat paler in the figure, as they are not brown, but only yellow.

*Hab.* Cuba (Poey).

4. *T. fraterculus* Wied. ♂. (Tab. X, f. 6).—Lutea, thoracis vittis et scutello dilutius tinctis, ultimo abdominis segmento duobus præcedentibus simul sumtis paulo brevior, alarum rivulis lutescentibus, cellulâ basali secundâ et cellulâ discoidalis basi hyalinis, apice venæ longitudinalis quartæ recurvo.

Clay-yellow, longitudinal stripes of thorax and scutellum paler yellow; last abdominal segment a little shorter than the two previous ones taken together; wings with rather clay-yellow rivulets; first basal cell and root of the discal cell hyaline; the end of the fourth longitudinal vein curved forward. Long. corp. 0.26; long. al. 0.27.

SYN. *Dacus fraterculus* Wiedemann, Auss. Zw. II, p. 524.

*Trypeta unicolor* Loew, Monogr., etc., I, p. 70. Tab. II, f. 6.

To my former description of this species, I have to add two observations. First, it contains a misprint, as the third line should read "bristle very thin," and not "bristle very short." Secondly, the examination of well-preserved specimens renders it doubtless, that the dark spots on the thoracic dorsum, mentioned in the description, were produced by the immersion of the specimens in spirits, and that the better preserved specimens do not show them.

When I described *T. unicolor*, I took it for distinct from *Dacus fraterculus* Wied., as Wiedemann describes the bristles and hairs on head and thorax as black, and says that the large triangular hyaline spot at the end of the posterior margin is connected with the S-shaped hyaline band. The comparison of Wiedemann's original specimen, however, showed that my *T. unicolor* is nothing else but *Dacus fraterculus* Wied. By the terms *hairs* and *bristles* Wiedemann understood only the stronger and weaker bristles; the remaining short pile on the head and the thorax of his specimen is entirely similar to the yellowish pubescence of *T. unicolor*. The connection between the posterior hyaline spot with the S-shaped hyaline band, which he mentions, is only an apparent one, as the rivulet separating both is not interrupted at the tip of the triangular hyaline spot, but only very much faded.

*Hab.* Brazil, Peru, New Granada, Cuba.

*Observation.*—The *Tephritis obliqua* Macq. Dipt. Exot. II, 3, p. 225, Tab. XXX, f. 11, undoubtedly belongs in the relationship of the two preceding species; it differs, however, in the picture of the wings too much to be identified with any of them.

5. *T. ludens* n. sp. ♂. (Tab. XI, f. 19.)—Lutea, thoracis vittis et scutello lætius flavis, ultimo abdominis segmento duobus præcedentibus simul sumtis multo longiore, alarum rivulis lutescentibus, cellula basali secundâ et cellulæ discoidalis basi hyalinis, apice venæ longitudinalis quartæ recurvo.

Clay-yellow, longitudinal stripes of thorax and scutellum of a purer yellow; the last abdominal segment much longer than the two preceding ones taken together; wings with rather clay-yellow rivulets, the second basal cell and the root of the anal cell hyaline; the end of the fourth longitudinal vein curved forward. Long. corp. 0.30; long. al. 0.31—0.32.

Pale clay-yellow. Front of a somewhat more bright yellow,

of a very moderate breadth; the usual frontal bristles black, only the upper ones rather long and strong. The yellow antennæ almost as long as the face; arista long and slender, with a very short and delicate pubescence. Oral opening rather large; oral edge rather sharp. Proboscis and palpi yellow, the latter rather broad; the suctorial flaps somewhat prolonged. The upper side of the thorax of a light, bright clay-yellow; a sulphur-yellow middle stripe, gradually vanishing anteriorly, expanding posteriorly in a cuneiform shape, and nowhere well defined; scutellum sulphur-yellow; on each side, above the root of the wings, a well-marked pale-yellow longitudinal stripe, which runs from the transverse suture to the posterior margin of the thorax; quite on the lateral margin an indistinct, but broader pale yellow stripe; the humeral corner and a well-defined stripe on the upper part of the pleuræ, reaching to the root of the wings, likewise of a bright pale yellow. The very short pile on the thorax is yellowish; the usual bristles are black or blackish-brown. Scutellum with four black bristles. Metathorax clay-yellow. Abdomen with short yellowish pile and with black bristles on its posterior end; the last segment very much prolonged, much longer than the two preceding ones taken together (this character serves easily to distinguish this species from *T. fraterculus*, which is very much like it). Feet yellow; under side of the front femora with several blackish-brown bristles. Wings not very broad in comparison to their considerable length; the rivulets upon them are pale brownish-yellow with narrow, but little conspicuous, and not always perceptible brown borders; near the posterior margin and on the apex of the wing they are altogether brownish; the hyaline spaces between the rivulets are as follows: 1. An oblique band, interrupted upon the third longitudinal vein, the anterior part of which forms, immediately beyond the stigma, a spot extending from the costa to the third longitudinal vein, while the posterior part of the band occupies the portion of the basal cell which lies under the stigma, the basis of the discal cell and the second basal cell; 2. A broad S-shaped band which begins at the posterior margin, between the tips of the fifth and sixth longitudinal veins, passes between the two crossveins, reaches the second longitudinal vein, turns backwards and reaches the margin in the vicinity of the end of the fourth longitudinal vein; 3. A large triangular spot near the posterior margin, which fills a considerable part of

the second posterior cell, reaches with its tip considerably beyond the fourth longitudinal vein, and almost coalesces here with the S-shaped hyaline band. The external costal cell also is hyaline, with the exception of its basis, but has a more yellowish tinge than the other hyaline spaces. Stigma rather long, almost imperceptibly darker than its surroundings. Crossveins straight and steep; the third longitudinal vein distinctly bristly; the end of the fourth longitudinal vein turned forward; the posterior end of the anal cell drawn out in a very narrow, long lobe.

*Hab.* Mexico (coll. Winthem).

*Observation.*—The comparison of the description of *Trypeta fraterculus* and *T. ludens* shows the great resemblance of the two species and an entirely satisfactory distinctive character in the different length of the last abdominal segment. The females of these species, which unfortunately I have not seen, will probably be easy to distinguish, if attention is paid to the size, which is larger in *T. ludens*, to the somewhat broader cheeks, the longer last abdominal segment of this species, and to the course of the third and fourth longitudinal veins, which suddenly diverge here, while their divergency in *T. fraterculus* is much more gradual. In using the coloring for distinguishing the two species, a certain caution is necessary here, as well as in the other species of this group.

6. *T. tricineta* n. sp. ♂.—Lutea, scutelli basi tribusque abdominis fasciis nigris, alarum rivulis nigro-fuscis, apice venæ longitudinalis quartæ recurvo.

Clay-yellow; basis of the scutellum and three crossbands of the abdomen black; the end of the fourth longitudinal vein somewhat curved forward. Long. corp. 0.26; long. al. 0.26—0.27.

Clay-yellow, more yellowish-red on the thoracic dorsum. Head of the same color and shape as in the three preceding species. In the middle of the thoracic dorsum there is a longitudinal sulphur-yellow stripe, proceeding from the posterior margin; it is rather broad posteriorly, gradually becomes narrower anteriorly, and finally disappears near the anterior margin; moreover each posterior corner emits a conspicuous sulphur-yellow stripe to the transverse suture; the humeral callosity and a broad longitudinal stripe reaching from it to the root of the wing and then passing under the latter to the posterior part of the thorax,

are, likewise, sulphur-yellow. The very short pile on the thoracic dorsum is pale yellowish, towards the posterior corners only it assumes a blackish tinge or at least a blackish appearance. The black macrochætæ of the thoracic dorsum are similar, in number and position, to those of the three preceding species. Scutellum sulphur-yellow, with four macrochætæ on the margin. Metathorax brownish-black, with a clay-yellow longitudinal stripe in the middle of its superior margin. Abdomen on the 2d, 3d, and 4th segments with a transverse band near the anterior margin; that of the second segment is entire and occupies only one-half of its length; those of the third and fourth segments are narrowly interrupted in the middle and cover a little more than the anterior half of the segment; the fourth segment is hardly longer than the preceding two, taken together. Hypopygium clay-yellow. The pile on the abdomen is blackish, and yellowish only on the upper side of the first and on the pale-colored portions of the upper side of the second segment; in a reflected light, the pile on the whole abdomen assumes a paler hue; the rather weak bristles at the end of the last segment are black. Feet clay-yellowish; the pile and bristles are similar to those in the three preceding species. Wings hyaline, with a rather dark-brown picture; it is not quite as brownish-black as that of *T. serpentina* Wied. figured on Tab. XI, f. 25, but it is more like it than any other species to me known. In order to form an idea of the picture of the wings of *T. tricincla*, let us represent to ourselves that the whole outer costal cell in that figure is rather hyaline, that the regions figured in gray are yellow and those represented as black are dark brown; that the S-shaped rivulet, beginning at the basis of the third posterior cell, running towards the anterior margin, and ending at the apex of the wing, is, upon its latter half, at least one-half broader than represented; that the band beginning at the posterior margin and covering the posterior crossvein is also broader than represented in the figure, and this in such a manner, that its side, looking towards the root of the wing, is a little less concave; finally, add to this picture a little streak of a saturate brown, beginning at the posterior margin and reaching somewhat beyond the fourth longitudinal vein (at the very place where Tab. XI, fig. 22, shows a similar streak, reaching only as far as the fourth longitudinal vein).



*Hab.* Hayti (caught on shipboard, by Mr. P. R. Uhler, sixty miles northwest of St. Nicholas, Hayti).

*Observation 1.*—The *Trypeta* described by Wiedemann as *Dacus serpentinus*, differs from *T. tricineta* not only in the picture of the wings, but also in the coloring. Wiedemann's original specimen, compared by me, comes from Brazil; but I have received a number of specimens of the same species from Peru. The *Urophora vittihorax* Macq. Dipt. Exot. Suppl. IV, p. 286, Tab. XXVI, f. 11, is identical with *T. serpentina* Wied. The habitat "de l'Inde," given by Macquart, is certainly erroneous, if it means the East Indies; but the species may occur in the West Indies, just as *T. fraterculus* occurs in Peru, Brazil, and Cuba.

*Observation 2.*—*T. suspensa* Lw., *fraterculus* Wied., *ludens* n. sp., and *tricincta* n. sp., and a considerable number of other American species, among which *T. serpentina* Wied. and *obliqua* Macq., have already been mentioned above, form a well-defined group, which well deserves to be considered as a separate genus. The character which distinguishes it from all other *Trypetina*, is the course of the fourth longitudinal vein, which, towards its end, is curved forwards in a rather striking manner, and reaches the margin at a very acute angle, being prolonged beyond as the costal vein. With reference to this character I propose to call it *Acrotoxa*. The species of this group have, moreover, the following characters in common: In the structure of the head and of all its parts they resemble the species of *Hexachæta*; the thorax has a similar structure, but it is a little smaller in bulk, as compared to the rest of the body, and a little narrower between the roots of the wings; the macrochætæ of the thoracic dorsum agree with those of *Hexachæta* both in their number and position. The scutellum is smaller than in the latter genus and not quite as flat, and bears not six, but four macrochætæ. Front femora on the upper side with shorter, on the under side with longer bristles and the front tibiæ without bristles, as in the species of *Hexachæta*. Middle femora without bristles; only the basis of the under side is sometimes provided with one or several bristle-like hairs; the two rows of bristles which, in *Hexachæta*, are found on the under side of the middle femora, are replaced here by two rows of hairs. Middle tibiæ without bristles. Hind femora towards the end of their upper side, more or less densely

bristly, on the under side with somewhat longer pile and moreover from the basis to a little beyond the middle, with a rather sparse row of long, almost bristle-like hairs; hind tibiae ciliated with rather weak bristlets. Tegulae almost as much developed as in *Hexachæta*. Wings large, and, comparatively to their length, less broad than in *Hexachæta*; the venation, with the exception of the difference in the course of the fourth vein, already adverted to, is very like that of *Hexachæta*, only all the cells, and especially the stigma, are longer in comparison to their breadth; the posterior angle of the anal cell is drawn out in an equally long and pointed lobe; the whole of the first longitudinal vein and the third some distance beyond the small crossvein, are bristly. The very characteristic picture of the wings in *Acrotoxa* is sufficiently rendered by the figures 5 and 6 of Tab. X, and 19-27 of Tab. XI. The portions of this picture which could not well be called bands (*fasciæ*), or stripes (*vittæ*), I have called *rivulets* (following in this Meigen's example, who called them *rivuli* in latin, and *Bäche* in german). The same term may be applied to the species of *Acidia*. The species of *Acrotoxa* are often very much alike, and very difficult to distinguish in the male sex; the females are frequently easier to distinguish on account of the very different length of the ovipositor in different species.

*Observation 3.*—In view of the difficulty of this group and of the probable occurrence of species belonging to it in some portions of the North American continent and of the West Indies (besides *Trypeta fraterculus* Wied., already referred to), I deem it useful to enter into a more detailed examination of them. Most of the numerous *Acrotoxæ* occurring in the European museums come from Brazil, and pass rather indiscriminately for the *Dacus parallelus* Wied. I will give a description of this species, based upon the original specimens in the Wiedemann-Winthem and the Seckenberg collections, and of some of the species more closely allied to it, confining myself to those species only which are known in both sexes. Special mentions of coloring and picture will be omitted, as the former is clay-yellow in all the species, and the latter very probably is pretty much like that of *T. ludens*, as given above, at least in living specimens; in drying it becomes somewhat indistinct, and affords no trustworthy marks for discrimination.

**a. *T. parallela* WIED. ♂ ♀. (Tab. XI, f. 20.)**

Long. corp. 0.37, long. terebræ 0.20—0.21; long. al. 0.40.

Arista with a short pubescence, which is longer, however, than in the following species. The pile on the body in general is somewhat longer than in those species, which is especially perceptible on the abdomen of both sexes and on the ovipositor. Ovipositor slender, not quite as long as the thorax and the rounded abdomen of the female taken together. Wings comparatively broad and very blunt and rounded at the tip; their venation differs from the allied species in the distinct undulation of the second vein and the peculiar bend, which the last section of the third vein shows in the vicinity of the small crossvein; two characters of which there is an indication in *T. consobrina* only. Picture of the wings brownish-yellow, in some places brown, more intense than in the following species; the uninterrupted and even course of the first hyaline space from the basis of the second basal cell to the costa is especially characteristic. The picture of the wings varies sometimes in the fact that both the S-shaped and the V-shaped rivulet each emit, exactly upon the third longitudinal vein, a little pointed projection, almost forming a narrow bridge between them; sometimes the portion of the V-shaped rivulet, cut off by the fourth vein, is filled by a brownish-yellow coloring; I have observed this variety much more often in female than in male specimens.

*Hab. Brasil.*

**b. *T. hamata* n. sp. ♂ ♀. (Tab. XI, f. 22.)**

Long. corp. 0.39, long. terebræ 0.26; long. al. 0.41—0.42.

Abdomen short. The ovipositor slender, proportionally somewhat longer than in *T. parallela*. Wings comparatively narrower and less rounded towards the end; second longitudinal vein without any trace of an undulated course and the third longitudinal vein beyond the small crossvein without the curvature, so characteristic in *T. parallela*. Picture of the wings paler and more yellow than in the latter species; the branch of the V-shaped rivulet which is more distant from the tip of the wing is prolonged in front beyond the third vein, without diminution of its breadth, so that it coalesces with the S-shaped rivulet between the third and the second vein; the branch of the V-shaped rivulet which is nearer the apex of the wing is either altogether wanting, or its pale yellowish tip only is visible near the posterior margin, as it is represented on Tab. XI, f. 22. The hyaline band running from the basis of the second basal cell towards the costa forms (as it also does in *T. consobrina* and *pseudoparallela*), a row of three contiguous spots. Besides the different picture of the wings, *T. hamata* differs from *T. consobrina* and still more from *T. pseudoparallela* in the shape of the wings, which are comparatively narrower and a little less obtusely rounded at the tip. Moreover, the ovipositor of the female is a little shorter and more slender towards the tip than in *T. consobrina*; but it is very much longer than that of *T. pseudoparallela*.

*Hab. Brasil.*

**c. *T. integra* n. sp. ♂ ♀. (Tab. XI, f. 23.)**

Long. corp. 0.41, long. terebræ 0.36—0.37; long. al. 0.42.

The abdomen of this species is longer and narrower than in the other species. The picture of the wings is paler and yellower than that of *Trypeta parallela*, but otherwise resembles it more than any other, as in both, the first hyaline band is not divided in three contiguous spots. However, in the present species this band becomes narrower towards the costa and stops before reaching it, neither of which is the case in *T. parallela*. Moreover, its wings are much narrower and less obtusely rounded at the tip; likewise they show no trace of the wavy course of the second longitudinal vein and of the curvature of the third, which is so well marked in *T. parallela*. The ovipositor is remarkably long in comparison to the size of the body, longer than in all the other species described here. The design of the picture might give rise to the supposition that *T. integra* and *T. obliqua* Macq. are identical. The much smaller size of *T. obliqua* Macq. and the much shorter ovipositor, however, render this impossible. From *T. consobrina* and *pseudoparallela* this species is sufficiently distinguished by the different shape of the first hyaline band of the wings.

*Hab.* Brazil.

**d. *T. consobrina* n. sp. ♂ ♀. (Tab. XI, f. 21.)**

Long. corp. 0.31—0.32, long. terebræ 0.26—0.27; long. al. 0.38.

Abdomen short. The venation shows more analogy to that of *T. parallela* than to any other species mentioned here, as the third longitudinal vein is somewhat curved beyond the small crossvein; the second longitudinal likewise shows a vestige of a weak undulation (which is not rendered in the figure). The outline of the wings likewise resembles that of *T. parallela* especially in the obtuse rounding of the apex; but the wings are narrower in comparison to their length. The picture of the wings is considerably paler than in *T. parallela*, and resembles in outline that of *T. pseudoparallela*, so that the males of both species may easily be taken for each other, unless attention is paid to the difference in the course of the third vein. The females of both are very easily distinguished, as the ovipositor of *T. consobrina* is considerably longer than that of *T. pseudoparallela*.

*Hab.* Brazil.

**e. *T. pseudoparallela*. ♂ ♀. (Tab. XI, f. 24.)**

Long. corp. 0.35, long. terebræ 0.13—0.14; long. al. 0.38—0.39.

The wings resemble those of *T. parallela* in outline very much, differ, however, in the fact that the second and third longitudinal veins do not show the peculiar course which they have in *T. parallela*. The picture of the wings is but little paler than in *T. parallela*, but differs from it considerably in the breaking up of the first hyaline band into three con-

iguous spots. In speaking of *T. consobrina*, I have adverted to the difference between the males of the two species, which otherwise are closely alike. The female of this species cannot easily be mistaken for that of *T. consobrina* or any other of the species described here.

*Hab. Brazil.*

The great importance which the comparative length of the ovipositor has for determination of the closely resembling species of the present group, induces me to give here the following figures representing the average of several measurements. The relation of the length of the ovipositor to that of the rest of the body is in *pseudoparallela* 1:2.6; in *parallela* 1:1.8—1.9; in *hamata* 1:1.5; in *consobrina* 1:1.2; in *integra* 1:1.1. Their relation to the length of the wing is in *pseudoparallela* 1:2.8; in *parallela* 1:2.1; in *hamata* 1:1.6; in *consobrina* 1:1.4; in *integra* 1:1.2.

*Trypeta Ocrezia* Walker (List, etc., IV, p. 1016), from Jamaica, is an *Acrotoxa*, closely allied to the species described by me. Whether *Trypeta Acidusa* Walker (ibid., p. 1014) from Jamaica likewise belongs here is uncertain, as the author does not state whether the end of the third longitudinal vein is directed forwards or backwards; moreover there is no statement whatever concerning the shape of the scutellum and the number of its bristles. If this species is an *Acrotoxa*, it cannot possibly be identified with any of those described above, on account of the differences in the coloring. The same applies, in a greater measure still, to *Trypeta serpentina* Wiedemann, already alluded to above.

In order to bring together whatever I know concerning the *Trypetæ* belonging to the group *Acrotoxa*, I give on Tab. XI, f. 26, a copy of the figure of the wing of *Trypeta grandis* Macq. (Dipt. Exot. Suppl., I, p. 212. Tab. XVIII, f. 14), from New Granada, and on Tab. XI, f. 27, that of the wing of *Urophora bivittata* Macq. (Dipt. Exot., II, 3, p. 222. Tab. XXX, f. 7), of unknown *habitat*. Both wings show an outline somewhat different from the other *Acrotoxæ*, more oblique transverse veins, a more narrow first posterior cell, a weaker forward turn of the third vein, etc. I am inclined to believe that these differences do not, for the most part, exist in reality, but are only due to the usual inaccuracy in Macquart's figures; and for this reason I believe that both *T. grandis* Macq. and *Urophora bivittata* Macq. are *Acrotoxæ*. Should my supposition prove correct, then it becomes very probable that America is the *habitat* of the latter species.

**7. *T. vulnerata* n. sp.** ♂ ♀.—Fusco-nigra, infra fusca; caput ex-albidum, fronte et facie ochraceo-vittatis, antennis, palpisque lutescentibus; scutellum subtumidum, setis quatuor præditum; pedes lutei, femoribus tamen posterioribus fusco-nigris; alæ latiusculæ, cellulâ stigmatica brevissimâ, quadratâ, cellulâ marginali latâ et cellulâ posteriore primâ adversus apicem angustatâ instructæ, fasciis nigris inter se coherentibus similiter atque *Aciura lychnidis* F., pictæ, colore tamen nigro adversus alarum basim latius diffuso.

Blackish-brown, under side brown; head whitish, front and face with an ochre-yellow longitudinal stripe, antennæ and palpi more clay-yellowish; scutellum rather tumid, with four bristles; feet clay-yellowish, the posterior femora, however, brownish-black; wings rather broad, with a short, square stigmatical cell, a broad marginal cell and a first posterior cell, which is attenuated at the posterior end; the black, connected crossbands almost resemble those of *Aciura lychnidis* Fab., but the black coloring is more extended towards the basis. Long. corp., ♂, 0.18, ♀, cum terebrâ 0.24; long. al. 0.18.

Coloring of a rather shining brownish-black; the humeral region and the under side of thorax and abdomen brown. Head whitish, front and face with a conspicuous ochre-yellow or almost orange-yellow middle stripe. Antennæ clay-yellowish, descending below the middle of the perpendicular, very little concave, face; the first two joints with short black pile; the third with an almost sharp anterior corner; arista brownish-black with an extremely short pubescence; oral opening of a medium size; the broad palpi do not extend beyond its anterior edge, which is slightly drawn upwards. Cheeks of a very moderate breadth; at the lower corner of the eye, there is an ochre-brownish spot and a black bristle. The usual frontal bristles black and of a considerable length; between the two black bristles inserted upon the little stripes, coming down from the vertical margin, there is, on each side, a short, white bristle; four similar bristles are inserted upon the posterior vertical margin; the erect pile of the occiput and the cilia of the upper posterior orbit of the eye are white. Thoracic dorsum and pleuræ with a very scattered, almost stubble-shaped white pile and black bristles. Scutellum very convex, perceptibly swollen, with four long bristles. The intermediate abdominal segments have a more or less distinct pale coloring on the posterior margin; all segments, with the exception of the posterior one, have some scattered whitish pile towards the posterior margin and blackish pile on the lateral margins; the

last segment, towards its end, has several black bristles. Ovipositor flat, rather broadly truncate, hardly as long as the last three abdominal segments taken together, blackish-brown or black, with black pile. Front feet, as well as the entire fore-coxæ, clay-yellow; on the posterior feet the first joint of the coxæ and the femora are brownish-black, or dark brown, the second joint of the coxæ, the tip of the femora, and the entire tibiæ and tarsi are clay-yellow; the under side of the front femora bears a row of black bristles, while the under side of the posterior femora is without them. Halteres infuscated. Wings large, rather broad, with convex anterior and posterior margins; veins, with the exception of the first longitudinal, without bristles; the first longitudinal vein turns, not very far beyond the end of the auxiliary vein, in a sharp, rectangular fracture, perpendicularly towards the margin of the wing, which causes the stigmatal cell to assume a strikingly short and square shape; the second longitudinal vein is rather distant from the anterior margin of the wing and has a rather straight course, so that the marginal cell, although rather broad, is attenuated towards its end; the third longitudinal vein is turned backwards towards its end, so that the first posterior cell is somewhat attenuated at the end; the small crossvein is placed about the middle of the discal cell, which becomes considerably broader towards its end; the last section of the fourth longitudinal vein has a wavy course; the posterior crossvein is very steep and only very gently curved; the posterior angle of the anal cell is drawn out in a point in the usual way. The picture of the wings has somewhat the appearance of rivulets, and consists of conspicuous and rather well-defined brownish-black crossbands, which come in contact almost in the same way as in the European *Acidia lychnidis* Fab. (compare Loew, *Bohrfliegen*, Tab. III, f. 4); the picture of the present species differs, however, in the more considerable extent of the black coloring on the basis of the wings; the black bands leave two hyaline indentations on the anterior and three on the posterior margin; these hyaline spots have, in a certain light, a whitish reflection. The first of these spots on the anterior margin is a rectangular triangle, the hypotenuse of which begins on the costa a little before the end of the first longitudinal vein and runs as far as the anterior end of the small crossvein; the second hyaline spot, separated from the first by an almost perpendicular

dark band, runs from the costa over the middle of the penultimate section of the fourth vein, as far as the middle breadth of the discal cell. The first hyaline spot of the posterior margin begins at the end of the last longitudinal vein and reaches as far as the fourth vein; the second and third spots begin, as usual in the species with this kind of picture, at the posterior end of the second posterior cell; both are very pointed at their end, and while the second spot reaches only to the fourth vein, the third goes as far as the third vein. Besides these hyaline spots, there is, at the basis, a small hyaline mark, connected with the whitish tegulæ; in the anal angle of the wing, near the margin, there is a diluted dot. The last of the dark bands is separated from the costa, as far as the third vein, by a narrow, hyaline border; the small crossvein has a similar, very narrow, hyaline border. A peculiar mark of this species is, that the spot at which the second and third longitudinal veins diverge, forms a knot-shaped, blood-red swelling, like a drop of coagulated blood; the first longitudinal vein, near its basis, likewise shows a more or less distinct blood-red coloring.

*Hab.* Massachusetts (Mr. Sanborn).

*Observation.*—*Trypeta vulnerata* cannot be well located in any of the genera hitherto formed out of the old genus *Trypeta*. The great resemblance of the picture of its wings to that of *Acidia lychnidis* Fab. (= *discoidea* Meig.), naturally suggests its location in the same genus. A closer examination, however, proves that, although its relationship to the species of that genus is rather close, it differs very much in the structure of the head, the very much more swollen scutellum, the structure of the ovipositor, some details in the venation, and the almost stubble-shaped pile. Thus we are compelled to establish a separate genus, *Stenopa*, for it, which finds its place next to *Acidia*.

**S. T. fratria** Lw. ♀. (Tab. X, f. 4.)—Lutea, corpore brevi et latiusculo, scutello setas quatuor gerente; alæ rivulis luteo-fuscanis, macularum ovatarum hyalinarum in apicali cellula discoidalis parte sitam includentibus, apice venæ longitudinalis quartæ non recurvo.

Clay-yellow, stature short and somewhat broad, with four bristles on the scutellum; wings with yellowish-brown rivulets, which inclose an oval, hyaline spot before the end of the discal cell; the end of the fourth longitudinal vein is not curved forwards. Long. corp. 0.22; long. al. 0.22.



**SYN.** *Trypeta fratria* Loew, Monographs, etc., I, p. 67. Tab. II, f. 4.  
? *Trypeta liogaster* THOMSON, Eug. Resa, p. 578, No. 251.

**Hab.** United States (Osten-Sacken).

**Observation.**—I have nothing to add to the description of this species as given in the first part of these Monographs. Its close relationship to the European *T. heraclei* Lin. is a sufficient proof that this species is a true, typical *Acidia*. I believe that *T. liogaster* Thoms. is this same species, although he describes the ovipositor as darker than I find it in my specimen.

**9. T. suavis** Lw. ♂. (Tab. X, f. 10.)—Dilute lutea, corpore brevi, latiusculo, scutello setis quatuor instructo; alæ rivulis latissimis fuscis, in formam litteræ S confluentibus, plume, apice venæ longitudinalis quartæ non recurvo.

Pale clay-yellowish, stature short and rather broad, scutellum with four bristles; wings with very broad brown rivulets, which coalesce in the shape of the letter S; the tip of the fourth vein is not curved forwards. Long. corp. 0.20; long. al. 0.21.

**SYN.** *Trypeta suavis* Loew, Monographs, etc., I, p. 75. Tab. II, f. 10.

**Hab.** Middle States (Osten-Sacken).

I possess only one very badly preserved specimen, which I described in the Monographs, etc., Part I. The species is easily distinguished on account of the peculiar picture of its wings. Of all the genera hitherto established in the family *Trypetidæ*, the present species undoubtedly belongs to *Acidia*; and, as far as the imperfect preservation of my specimen allows an opinion, it agrees with the *Acidiæ* in all the important characters, except one: while all the European *Acidiæ* have the third longitudinal vein more or less bristly, I perceive no bristles, whatever, in *T. suavis*, and have no reason to suppose that they have been rubbed off. Such an agreement of characters decides me to place *T. suavis* in the genus *Acidia*; at the same time, however, the bristles of the third longitudinal vein cannot any longer be considered as characteristic of the genus *Acidia*.

**10. T. canadensis** n. sp. ♀.—Dilute lutescens, segmentis abdominalibus tertio et quarto fusco-fasciatis, corpore brevi, latiusculo, terebrâ medioocri, latâ et late truncatâ; alarum rivuli angusti, fusci, apex venæ longitudinalis quartæ non recurvus.

Pale clay-yellowish, with a brown crossband on the third and fourth abdominal segments, stature short and somewhat broad; ovipositor of

medium length, broad and broadly truncate; wings with narrow pale brownish rivulets and with a fourth longitudinal vein which is not curved forwards at the tip. Long. corp. 0.18, cum terebra 0.23; long. al. 0.20.

Pale clay-yellowish. The head resembles that of *T. fratria* in shape, only the front is somewhat broader and the vertical diameter of the eyes is a little smaller; the anterior edge of the mouth is more projecting. On the border of the front the described specimen bears, on each side, three long, but rather weak black bristles. Antennæ of a more saturate yellow, not reaching the edge of the mouth; their third joint is rounded at the tip; arista blackish, yellow towards the basis, with a very short pubescence. Rostrum and palpi pale yellow, the latter not reaching beyond the anterior edge of the oral opening. Thoracic dorsum with a very thin, whitish bloom, only the double middle stripe and the narrow lateral stripes not pollinose, rather shining and somewhat darker than their surroundings. The posterior end of the thoracic dorsum and the scutellum likewise without pollen, shining, very pale yellow; a not very broad yellowish stripe runs from the humeral corner to the root of the wings. The scutellum is convex and not very large; in my specimen it has three bristles on one side and only two on the other, so that I cannot say whether the normal number of the bristles of the scutellum is six or four. The bristles of the thorax and of the scutellum, as well as the short pile of the thoracic dorsum, are black. Metathorax distinctly infuscated on its superior margin and its middle line. Abdomen shining, with short black pile; the third and fourth segments have, each at its basis, a chestnut crossband, interrupted upon its middle, while upon the second segment only a lateral beginning of such a stripe is indicated by a chestnut-brown spot. The very broad ovipositor is flat, almost as long as the last three abdominal segments taken together, very broadly truncate and infuscated at the end. The front femora are sparsely beset with bristles upon the upper and under side; the middle femora are entirely without bristles; upon the hind femora, likewise, there are only a few bristle-like hairs before the end of the upper side; the upper side of the hind tibiæ is merely beset with exceedingly short bristle-like hairs. Wings of the usual shape, hyaline, with a pale-brown picture; it consists: 1. In an oblique half crossband running from the humeral crossvein

to the basis of the second basal cell; 2. Of a crossband parallel to the first, abbreviated behind, which begins at the stigma, near the anterior margin, and runs across the basis of the submarginal cell, as well as across the crossveins, which close the second and third basal cells, and thus reaches the sixth longitudinal vein; 3. Of a rivulet which begins above the posterior crossvein, near the third longitudinal vein, runs from it across the posterior crossvein as far as the posterior margin, is continued along this margin inside of the third posterior cell, but, before reaching the sixth longitudinal vein, is suddenly turned upwards, running parallel to the band which begins at the stigma, crossing the small crossvein, and thus reaching the anterior margin, where, gradually expanding, it forms a border ending a little beyond the tip of the fourth crossvein. The two crossbands, as well as the rivulet, are of moderate breadth only; the latter has, in the described specimens, the following faded spots, which, in more fully colored specimens, are probably less apparent or altogether absent: 1. A rounded spot in the marginal cell, above the origin of the rivulet; 2. Upon the longitudinal axis of the submarginal cell an indentation in the inner margin of the section bordering the apex of the wing; 3. Upon the longitudinal axis of the first posterior cell an interruption of the rivulet at its origin and an indentation in the inner margin of the portion bordering the apex of the wing; 4. Upon the longitudinal axis of the discal cell a narrow interruption of the section, running again towards the anterior margin; 5. The spot upon the posterior margin connects the first, descending, portion, with the second, which rises again upwards. The first and third longitudinal veins are bristly; the third and fourth are parallel towards their end, both very gently curved backwards; the section of the fourth vein preceding the discal cell is gently, but rather distinctly arcuated backwards, so that the shape of the discal cell somewhat reminds of that of the species of *Rivellia*; the crossveins are comparatively rather long, moderately approximated, their distance being about equal to the length of the posterior crossvein; the latter is rather steep, however, perceptibly approximated to the apex with its anterior end, more than with the posterior; the posterior corner of the anal cell is very much drawn out in a point.

*Hab.* Canada (Mr. Provancher). [Norway, Maine; S. J. Smith—seems to be a common species in those regions. O. S.]

*Observation.*—*Trypeta canadensis* resembles the species of *Acidia* in its general habitus and, at first sight, seems to differ only in the somewhat modified picture of the wings, which seems to hold the middle between the rivulet and the crossband. A closer examination shows, that in the structure of the head and of its parts, as also in the bristles upon the feet, this species is closely allied to *Acidia*, but that it also shows characters not belonging to that genus; such is the structure of the ovipositor, which is longer, quite flattened, and broadly truncate at the end; also the very peculiar course of the section of the fourth longitudinal vein preceding the small crossvein. If the scutellum is provided with six bristles in normal specimens, we would have another important distinctive character from *Acidia*. Thus the admission of *T. canadensis* in the genus *Acidia* would render the limitation of this genus too indefinite, and it becomes necessary to establish a new genus for it, which would be characterized by a modified type of the picture, a peculiar course of the fourth vein, and a different structure of the ovipositor. I will call this genus *Epochra*.

**11. *T. longipennis* WIED.** ♂ ♀. (Tab. X, f. 2 ♂, 3 ♀.)—Lutea, capite tumido, corpore elongato et angusto; alæ longæ et angustæ, maris adhuc longiores et angustiores quam feminae, rivulis luteo-fuscanis pictæ.

Clay-yellow; head tumid; body long and narrow; wings long and narrow, those of the male still longer and more narrow than in the female, pictured with yellowish-brown rivulets. Long. corp. 0.17—0.26; long. al. 0.22—0.30.

**SYN.** *Trypeta longipennis* WIEDEMANN, Auss. Zweifl., II, 483, 12 (♂ ♀).

*Strauzia armata* R. DESVOIDY, Myod. 719, 2 (♂).

*Strauzia inermis* R. DESVOIDY, Myod. 718, 1 (♀).

*Tephritis trimaculata* MACQUART, Dipt. Exot., II, 3, p. 226, 8. Tab. XXXI, f. 3.

*Trypeta cornigera* WALKER, List Brit. Mus., IV, p. 1010.

*Trypeta cornifera* WALKER, List Brit. Mus., IV, p. 1011.

*Trypeta longipennis* LOWE, Monographs, etc., I, p. 65.

It cannot be doubted that *Trypeta longipennis* Wied., either is a very variable species, or that North America possesses a number of closely allied species, resembling it very much, and which, as long as they are represented only by single, often imperfectly preserved specimens, it is as difficult to distinguish

and to describe as, for instance, the majority of the European *Urophoræ*. It is only by observations upon the insect in life, that the question will probably have to be solved, whether we have here different species or only varieties. In writing the first part of these Monographs I surmised that I had specimens of a single, but very variable species before me. In the mean time my materials have increased considerably, and specimens have been added to it, which differ so materially from the typical *T. longipennis*, that my former conviction has been shaken, without, however, having been superseded by the opposite one. I prefer therefore to continue to treat these different forms as varieties of the same species, but, at the same time, to define these varieties with more precision than has been done in the first part of the Monographs. In order to avoid useless repetitions, I will notice in advance that in all the varieties the anterior end of the middle stripe is colored black, and that in all of them, immediately above the root of the wing, there is a small, deep-black dot, which is not visible when the wings are folded.

1. *Varietas perfecta*, ♂ ♀.—Of the four lateral bristles of the front, the two upper ones, in the male, are very much incrassated and truncated at the end. Thorax without black lateral stripes. Scutellum unicolorous; metathorax without black picture. Picture of the wings not very deep in its coloring, complete in both sexes; the male as Tab. X, f. 2.

Of this variety I have compared rather numerous specimens. Among those of my collection there is a male and two females, caught at the same time.

2. *Varietas typica* ♂ ♀.—Of the four lateral bristles on the front the two upper ones are very much incrassated in the male and truncate at the end. Thorax without black lateral stripes; scutellum upon each lateral corner with a well-defined black spot. Metathorax without any black coloring. The picture of the wings is of a rather dark shade, especially towards the tip; complete in the female, incomplete in the male, almost like Tab. X, f. 2, except that the rivulet covering the posterior crossvein does not reach the margin of the wing, but gradually becomes more attenuated and pointed and never reaches beyond the posterior end of the posterior crossvein; the branch of this rivulet which runs along the last section of the fourth vein is likewise very narrow and always disappears at a considerable distance from

the margin of the wing; the hyaline interval between it and the branch bordering the anterior margin of the wing is, in the male, comparatively longer and conspicuously narrower than in var. *perfecta*; the female shows the same difference, but very feebly.

Wiedemann's description is based upon specimens of this variety, which is a very common one. The other synonyms, quoted above, likewise belong here, with the only exception of *Trypeta cornigera* Walker. I possess of this variety four perfectly well-preserved specimens (a male and three females), caught at the same time by Mr. Auxer in Lancaster City, Penn.; the three females have, at the posterior end of the two posterior abdominal segments, longer, stronger, and somewhat more abundant pile than the females of other varieties.

3. *Varietas longitudinalis* ♂ ♀.—Of the four lateral bristles of the front the two uppermost, in the male, are very much incrassated and truncated at the end. Thorax without any black lateral stripes; scutellum on each lateral corner with a black spot; metathorax without black picture. The wings of the male comparatively narrower than in all the other varieties; their picture coalesces into a single broad longitudinal stripe, which, from the root of the wing as far as nearly the end of the posterior basal cells, has a dirty clay-yellowish coloring; beyond this point, it changes into dark-brownish. The interval between the second and fourth longitudinal veins is completely filled by this stripe, with the only exception of a small hyaline spot at the end of the fourth longitudinal vein; moreover, the stripe encroaches a little beyond the second and fourth veins in the shape of little wavy expansions. The picture of the female hardly differs from that of var. *typica*; only the spot in the costal cell, between the stigma and the humeral crossvein, which is usually wanting in var. *perfecta* and present in var. *typica*, is much darker than in the latter species; this is also the case in the male.

These statements are taken from a very fine pair of specimens from Sharon Springs, N. Y., collected by Baron Osten-Sacken. He sent me at the same time a male from Connecticut (collected by Mr. Bassett), which agrees with the former in the picture and in the shape of the wings, except that the uniformly brown part of the picture of the specimen from Sharon is clouded with yellowish-brown and dark-brown; moreover, in the latter specimen, the spot placed between the humeral crossvein and the stigma is

very much faded. The description which Mr. Walker gives of his *Trypeta cornigera* refers, if I understand it right, to this variety. [The male specimen from Sharon was caught on the same spot with the female; I possess, moreover, a couple from Connecticut, stuck on one pin, as if caught *in copula*. Thus there can hardly be a doubt as to the sexes belonging together, the very different picture notwithstanding. O. S.]

4. *Varietas vittigera*, ♂ ♀.—Of the four lateral bristles of the front, the two upper ones are very much incrassated and truncate at the end. The thoracic dorsum shows, besides the anterior end of the middle stripe, two well-marked black lateral stripes of a moderate breadth, abbreviated in front, rather broadly interrupted at the transverse suture and pointed posteriorly. Scutellum, upon each lateral corner, with a black spot; metathorax on each side with a deep black longitudinal spot. Wings of the male somewhat less elongated than in the male of the var. *perfecta*. The picture of the wings in both sexes is complete, hardly different from that of var. *perfecta*. Of this variety I possess only a male and a female from Nebraska (Dr. Heyden).

5. *Varietas intermedia* ♂.—Of the four lateral bristles of the front, the two superior ones, although strong, are not incrassated and not truncate at the tip, but end, as usual, in a point. Thorax without black lateral stripes; scutellum upon each lateral corner with a black spot; metathorax on each side with a deep black longitudinal spot. Wings of the male less elongated, and perceptibly less pointed than in the first two varieties; the picture of the wings rather intense in coloring, the design resembling that of the female of the first variety; however, the hyaline band passing between the two crossveins is rather conspicuously expanded at its posterior end. The last joint of all the feet is rather conspicuously infuscated on the sides and at its end. Of this variety I possess only a single male, without indication of the precise locality.

6. *Varietas confluens*, ♂.—Of the four lateral bristles of the front the two upper ones are rather strong, but not incrassated and not truncate at the tip, but end, as usual, in a point. The thoracic dorsum, besides the anterior end of the middle stripe, shows two well-defined black lateral stripes of a moderate breadth, which are abbreviated anteriorly, rather broadly interrupted at the transverse suture, and pointed posteriorly. Scutellum upon

each lateral corner with a black spot. Metathorax on each side with a deep-black longitudinal spot. Wings of the male comparatively less elongated, and less attenuated towards the tip, consequently comparatively broader than in the first and second variety. The picture of the wings is complete, its coloring uniform, not very saturate, seldom here and there with a trace of darker margins; the oblique hyaline crossband passing between the crossveins is comparatively narrow, reaches, however, the anterior margin completely. The brownish-yellow rivulet rising across the posterior crossvein is of a considerable breadth in all its parts, so that the branch of it which borders the margin of the wing and that which runs along the last section of the fourth longitudinal vein, coalesce in their middle.

I possess a single male only (Connecticut; Mr. Norton); it is one of the smallest specimens of this species in my collection.

7. *Varietas arculata* ♂.—Of the four lateral bristles of the front, the two upper ones are not stronger than usual among the species of the same size; as usual, also, they end in a point. The thoracic dorsum shows, besides the anterior end of the middle stripe, two strongly marked black lateral stripes of moderate breadth, which are abbreviated anteriorly, rather broadly interrupted at the transverse suture, and end in a point posteriorly; scutellum with a black spot upon each lateral corner; metathorax on each side with a deep black longitudinal spot. The wings of the male are less attenuated towards the apex than in the males of the first and second varieties, but comparatively less broad than in the sixth variety. The picture of the wings has a rather uniform yellowish-brown coloring. It differs from that of all the other varieties in the fact that the oblique hyaline band, running between the two crossveins, does not reach the anterior margin, but suddenly ends between the second and the third longitudinal veins, so that the border of the anterior margin is not at all interrupted beyond the triangular hyaline spot near the stigma; at the same time, this hyaline band is connected with the hyaline streak in the latter portion of the first posterior cell, the rivulet crossing over the posterior crossvein being interrupted here. These modifications give the picture a very different appearance.

Of this variety I likewise possess but one specimen (Illinois; Mr. Brendel); it is but little larger than the male specimen of the sixth variety.



*Observation.*—*Trypeta longipennis* has no immediate relatives among the European *Trypetidæ*. From *Spilographa abrotani* Meig., and *macrochaeta* Lw., which resemble it somewhat in the peculiar shape of the frontal bristles, it differs too much, in the stature of the body, the shape of the head, as well as in the outline, the venation, and the picture of the wings, to be placed in the same genus *Spilographa*. It must be considered, therefore, as the type of a separate genus. Mr. R. Desvoidy has given it the name of *Strauzia*, which may be preserved, after being modified into the more correct form of *Straussia*. The principal characters of the genus *Straussia* are the following:—

Body long and narrow; head remarkably swollen, especially the occiput; eyes rounded and rather small for a *Trypeta*, so that in the profile the front advances much before the eyes and the cheeks are very broad. Lateral border of the front raised in the shape of a cushion, so that the whole front assumes the appearance of a basin. Antennæ short, reaching, perhaps, as far as the middle of the face; the last joint rounded at the tip. Face retreating inferiorly; oral opening small, without any sharp anterior edge; the rather broad palpi not reaching beyond this edge. Scutellum convex, with four bristles. Abdomen elongated and considerably narrower than the thorax. Ovipositor of the female not flattened. Wings comparatively long and only moderately broad, in the male narrower than in the female, especially towards their end; the picture consists of rivulets; first and third longitudinal veins distinctly bristly; the third and fourth veins towards their end somewhat divergent and rather strongly bent backwards; small crossvein placed about the beginning of the last third of the discal cell; the posterior angle of the anal cell is drawn out in a sharp point.

**12. T. electa** SAY. ♀. (Tab. X, f. 7.)—Lutea, vittis thoracis et scutello ex-albidis, angulis lateralibus hujus nigris; tibiæ posticæ setis nigris, proportione longis ciliatæ; alæ hyalinæ, fasciis duabus integris adversus marginem posticum convergentibus, strigulâ interjectâ a costâ ad venam longitudinalem tertiam ductâ, et costæ ipsius limbo inde a fasciâ secundâ usque ad apicem cellulæ posterioris secundæ pertinente, fuscis.

Clay-yellow, longitudinal stripes of the thorax and scutellum whitish; the latter with blackish lateral corners; posterior tibiæ ciliated with comparatively long black bristles; wings hyaline, with two complete

crossbands, converging towards the posterior margin, an incomplete band beginning at the anterior margin and running as far as the third longitudinal vein, and a border of the costa, beginning at the second crossband and ending at the tip of the second posterior cell; the whole of this picture being brown. Long. corp. 0.29; long. al. 0.29.

SYN. *Trypeta electa* SAY, Journ. Acad. Phil., VI, p. 185, 1.

*Trypeta electa* LOEW, Monographs, etc., I, p. 71, 6. Tab. II, f. 7.

I have nothing to add to the description, given in the first part of these Monographs, but I must observe that, deceived by Macquart's insufficient description of his *T. flavonotata*, I have taken it to be merely a paler variety of *T. electa* Say, while a specimen received since then has convinced me that it is a very closely allied but distinct species.

*Hab.* Florida (Osten-Sacken).

*Observation.*—*Trypeta electa* belongs in the genus *Spilograptha*.

13. *T. flavonotata* Macq. ♂.—Lutes, vittis thoracis et scutelle unicolore pallidioribus, tibis posticis setulis brevissimis pallidis subciliatis; alis hyalinis, fasciis duabus postice paulo abbreviatis adversus marginem posticum convergentibus, strigula interjecta a costa prope ad venam longitudinalem tertiam ducta et costae ipsius limbo inde a fasciâ secundâ usque ad cellulâ posterioris secundâ apicem pertinente, fuscis.

Clay-yellow, longitudinal stripes of the thoracic dorsum and the unicolorous scutellum paler; hind tibiae somewhat ciliated with very short, pale bristles; wings hyaline, with two crossbands, which are somewhat convergent posteriorly and interrupted a little before the posterior margin, a little crossband between them, extending from the anterior margin almost to the third longitudinal vein, and a border of the costa, running from the second crossband to the tip of the second posterior cell; the whole picture being brown. Long. corp. 0.18; long. al. 0.21—0.22.

SYN. *Tephritis flavonotata* Macq. Dipt. Exot. Suppl. V, p. 125. Tab. VII, f. 9.

This species is very like *Trypeta electa* Say, differs, however, from it as follows. It is smaller; the head is comparatively smaller and has much narrower cheeks. The third antennal joint ends at a much sharper angle. In what way the picture of the thorax differs from that of *T. electa* cannot be well ascertained in my specimen, in which it has become somewhat indistinct, probably in the process of drying; the whitish stripe, running from the humerus to the root of the wings, is very per-

ceptible; there is also a trace of the whitish stripe above the root of the wings; but this stripe shows no trace of the dark border on the inside, which it has in *T. electa*; nor do I see a whitish median line. Scutellum comparatively smaller and somewhat more convex, without black spot on the lateral corners. The upper border of the metathorax is marked, at each end, with a very small spot of a deep black color. The punctiform black lateral dots, which exist on the last abdominal segment of the female of *T. electa*, are not perceptible in the male of the present species. All the bristles of the body are less strong and of a paler color, especially upon the femora, and instead of the comparatively long black bristles with which the upper side of the hind tibiae of *T. electa* is fringed, there are in the present species only very short pale yellow bristlets. The third longitudinal vein of the wings has, at its basis, several little bristles, but upon the remainder of its course, is entirely bare (while the bristles extend much farther in *T. electa*). The picture of the wings is very like that of *T. electa*, with the following differences: the two crossbands in the middle of the wings do not altogether reach the posterior margin and are also less approximated, that is, they do not form the figure V; the basal portion of the submarginal cell lying before the first of these bands is hyaline; the picture in the vicinity of the root of the wing is much less extended and much paler, so that its darker portions do not, as in *T. electa*, form a kind of crossband, running almost parallel to the following band.

*Hab.* Yukon River, Alaska (R. Kennicott).

*Observation.*—*T. flavonotata* is very closely allied to those European species, which I have placed in the genus *Zonosema* (in my Monograph of the European *Trypetidæ*), and should be placed in it, as long as it is separated from *Spilographa*. Should, however, *Zonosema* be united with *Spilographa*, which seems the best course to follow, owing to the intermediate forms, which occur among the exotic species, then, as a matter of course, *T. flavonotata* will have to be placed in the genus *Spilographa*.

**14. *T. tetanops* n. sp. ♂.** (Tab. XI, f. 15.)—Mallea, capite subinflato, oculis parvis; alæ hyalinæ, fasciis duabus adversus marginem posticum convergentibus, strigulâ interjectâ inde a costâ ad tertiam usque venam pertinente, maculis denique duabus parvis, alterâ in venâ longitudinalis tertie, alterâ in quartæ apice sitâ, fuscis, his maculis limbo marginis tenuissimo fusco conjunctis.

Honey-yellow, with a rather tumid head and small eyes; wings hyaline, with a brown picture, which consists of two crossbands, converging towards the posterior margin, of a little band, between both, reaching from the costa to the third longitudinal vein and of two little spots upon the third and fourth longitudinal veins, which spots are connected by a narrow infuscation along the margin of the wing. Long. corp. 0.19—0.20; long. al. 0.17—0.18.

Honey-yellow, the head of a purer yellow, somewhat tumid. Front broad, with some scattered, short, very delicate blackish pile; its lateral bristles weak. Frontal lunule very small. Eyes small, elongated, with a rather projecting anterior corner. Face descending straight; edge of the mouth blunt, somewhat swollen; the conspicuously deepened antennal furrows become narrowed below and disappear in the lateral edges of the mouth; the part of the face between them forms an acute, level triangle; the cheeks are remarkably broad, beset with a few short black hairs; oral opening very small; clypeus unusually little developed; palpi short, but considerably broad, sparsely beset with short, black hairs. Proboscis rather short and stout; the stout suctional flaps, although somewhat long, are not prolonged, nor folded backwards. The upper side of the thorax, with the exception of the posterior and lateral margins, which are shining, is covered with a thin ochre-yellow pollen, and hence opaque; the short pile upon it and the bristles are black; the number and position of the latter is the usual one; of the two pairs of bristles in front of the scutellum, the anterior one is inserted upon very small dots of a somewhat darker color; in the proximity of the suture there are two similar dots; moreover, the trace of a slender dark middle line is perceptible. Scutellum shining honey-yellow, rather convex, sparsely beset with little black hairs and bearing four strong black bristles. Pleuræ of the same color with the scutellum, beset with black pile. Abdomen, likewise, shining honey-yellow, in the middle with a trace of an ochre-yellow dust, beset with black pile, but without longer bristles. The yellow feet have rather strong femora; the two front femora are beset with bristles upon the under and upper side. Wings hyaline, with a picture which is very like that of the two preceding species. The principal feature consists in two narrow brown transverse bands; the first, somewhat faded at its beginning, starts from the end of the stigma and runs perpendicularly over the small crossvein as far as the proximity of the posterior margin, while

the second begins at the tip of the second longitudinal vein and runs in an oblique direction over the posterior crossvein to the posterior margin; between these two bands there is a short, brown one, extending from the anterior margin to the third longitudinal vein; it follows the same direction as the second band; the tips of the third and fourth longitudinal veins bear each a small brown spot and these spots are connected by a narrow brown shade along the margin of the wing; a small brown spot covers the end of the anal cell, which is drawn out in an acute point; the inner costal cell, the beginning of the first basal cell, as far as the origin of the third vein, the basis of the submarginal cell as far as the first brown crossband, the stigma and the anal cell are tinged with yellow; a yellow coloring likewise surrounds that crossvein, which divides the second basal cell from the discal cell; the basis of the exterior costal cell is tinged with yellowish-brown. The third longitudinal vein is, in the vicinity of its origin, densely beset with bristles; more sparsely beyond that point; the third and fourth longitudinal veins somewhat diverge towards their end; the small crossvein is a little before the middle of the discal cell; the posterior crossvein is straight and steep.

*Hab.* Mexico (Deppe; Mus. Berol.).

*Observation.*—The principal difference between this species and the typical *Spilographæ* consists in the structure of the head, which has been described above; moreover, the wings are comparatively shorter and the third vein has, as far as its tip, an entirely rectilinear course, while, in all the species of *Spilographa* (comp. Tab. X, f. 7), it is gently curved backwards. Should a new genus be founded for this single species, the name *Ædicarena*, alluding to the structure of its head, might be adopted for it. It would seem preferable, however, until a number of allied species becomes known, to let *T. tetanops* remain in the genus *Spilographa*, with which it is undoubtedly related on account of the great resemblance of the picture of its wings with that of *T. electa* and still more of *T. flavonotata*.

**15. *T. sarcinata* Lw.** ♀. (Tab. XI, f. 16.)—Sordide lutea, dorso thoracis cinerascens, punctisque aliquot majusculis atris picto, scutello tumido, bimammato atro, alarum angulo axillari fascisque quatuor valde obliquis ex luteo fuscis, venis transversis obliquis et valde approximatis, cellulâ discoidali adversus basim valde angustatâ.

Dingy clay-yellow, with several deep black dots upon the gray thoracic dorsum and with a tumid bituberculate black scutellum; wings with a yellowish-brown posterior angle and four very oblique yellowish-brown crossbands, with oblique and very approximate crossveins and with a discal cell which is gradually attenuated towards its basis. Long. corp. 0.28; long. al. 0.26—0.27.

SYN. ? *Tephritis quadrfasciata* MACQUART, Dipt. Exot. II, 3, p. 226. Tab. XXX, f. 8.

*Trypeta sarcinata* LOWE, Berl. Entom. Zeitschr., VI, p. 218, and Dipt. Amer. Cent., I, 88.

Dark clay-yellow, almost brownish-yellow. The broad head is of a lighter color; front very broad, on the anterior part of the lateral margin with two bristles, and before them, near the orbit, with a small black dot. Antennæ yellowish, by far not reaching the edge of the mouth. Face somewhat excavated, but very little protruding towards the edge of the mouth, broad and with broad orbits along the eyes. Cheeks rather broad, with a small black spot near the lower corner of the eye. Oral opening transversely oval; proboscis and palpi yellowish, short, entirely withdrawn in the oral opening; the usual frontal bristles black; the pile on the cheeks, below the black dot which occurs upon them, blackish; the remaining pile on the head is whitish. The upper side of the thorax seems to have an almost black ground color, assumes, however, in consequence of the rather thick pollen which covers it, a gray, entirely opaque, appearance; upon the middle of the thorax, lengthways, there are three pairs of large, black, opaque dots, the largest, anterior pair being on the transverse suture, the posterior pair immediately in front of the scutellum; upon the lateral margin of the thoracic dorsum, the humeral callus, the callus in front of the root of the wings, and a rather large spot above the root of the wings are not clothed with pollen and rather shining black. The ordinary bristles are black; the bristles in pairs, along the thoracic dorsum, are inserted upon the black dots, described above, except upon the anterior pair (where they may have been rubbed off in the described specimen). Scutellum shining black, remarkably swollen, but with a strong coarctation along the longitudinal middle line, and thus appearing bituberculate; each of the tubercles bears a strong bristle, below which a second one, much weaker, seems to have existed. Metathorax and pleuræ clay-yellow; the immaculate, glabrous abdomen is of the same color. Ovipositor flat, pointed, somewhat longer

than the last four abdominal segments taken together, of the same color with the abdomen, or somewhat more reddish-yellow, black at the extreme tip only, with scattered, blackish pile. Feet dark clay-yellow. Wings rather large; their picture consists, besides the yellowish-brown posterior corner, of four oblique yellowish-brown crossbands, with dark-brown borders; the brown coloring which fills the posterior corner is separated from the first band on the posterior half of the wing only, and that by an oblique hyaline half band, lying in the third posterior cell, but which does not reach the root of this cell; a small, square hyaline spot near the humeral crossvein indicates the separation of the yellowish-brown coloring of the base of the wing from the first crossband; the first and second crossbands are completely coalescent before the third longitudinal vein; beyond this vein, they are separated by a hyaline, very oblique band, which begins below the basis of the comparatively long stigma and ends at the tip of the fifth vein; the second and third brown bands are separated by a narrow hyaline band, which crosses the whole breadth of the wing, but is almost interrupted upon the second longitudinal vein; the third and fourth brown bands, the latter of which runs along the apex of the wing, are entirely coalescent upon their anterior portion; their posterior portion is separated by a narrow, hyaline, half band, which does not reach the third longitudinal vein; upon the last section of the anterior margin the brown coloring is somewhat spotted and shows here and there a very small pale drop. The venation shows the following peculiarities; stigma rather long, third and fourth longitudinal veins curved backwards towards their end; the very approximate crossveins are very oblique and have their posterior ends nearer to the apex of the wing than the anterior ends; the discal cell is very much contracted towards the basis, and very much dilated towards the end; the posterior angle of the anal cell is drawn out in a sharp point; the third vein has scattered bristles upon nearly its whole extent.

*Hab.* South Carolina (Zimmerman; Mus. Berol.).

*Observation 1.*—In the synonymy, I have doubtfully quoted *Tephritis quadrifasciata* Macq. from Georgia. It is true that *Trypeta sarcinata* is not recognizable in Macquart's description; and if Macquart's figures had the least claim to faithfulness, the synonymy of these two species would be out of question. But

with the knowledge we have of the character of Macquart's publications, we cannot but suspect that his species is after all nothing but the one we have described above. The position and direction of the crossveins, as well as the general pattern of the picture of the wings, distinctly show a certain analogy to *T. sarcinata*. The synonymy cannot be assumed as certain, as Macquart, in his description, does not mention either the black dots on the thoracic dorsum, or the black coloring and the very striking shape of the scutellum of *T. sarcinata*; moreover his figure of the wing shows important discrepancies in outline, venation, and picture. By all means, should even the identity of these species be confirmed, Macquart's name would be lost for it, as it has been preoccupied by Meigen.

*Observation 2.*—The great approximation of the crossveins and their oblique position indicate the relationship of the present species with *Ædaspis*. It differs, however, in the peculiar shape of the scutellum, the greater length of the wings, and the shape of the discal cell, which is more attenuated towards the basis. The pattern of the picture of the wings differs from that of the European and American species, as far as they are known. For this reason, I do not think that it would be well placed in the genus *Ædaspis*, and I propose for it the formation of a new genus, *Peronyma*. The position and direction of the crossveins, as well as the picture of the wings (the second crossband of which, as in *Ædaspis*, incloses both crossveins), remind of *Trypeta obliqua* Say and the species related to it; however, the structure of these latter species has too little in common with *T. sarcinata* to allow their juxtaposition in the same genus.

**16. *T. discolor* Lw.** ♂. (Tab. X, f. 1.)—Lutea, abdomine nigro, alarum fasciis quatuor obliquis fuscis, primâ et secundâ antice, tertiâ et quartâ postice connexis, venâ longitudinali tertiâ setosâ, venisque transversis valde approximatis.

Clay-yellow, with a black abdomen; wings with four oblique infuscated bands, the first and second of which are connected anteriorly, the third and fourth posteriorly; the third longitudinal vein is beset with bristles; crossveins very much approximated. Long. corp. 0.13; long. al. 0.15.

**Syn.** *Trypeta discolor* Loew, Monogr., I, p. 64. Tab. II, f. 1.

*Hab.* Cuba.

This pretty species is so closely allied to *T. obliqua* Say, that



generically they cannot be separated; the systematic position of these two species and of some South American ones, related to them, will be discussed below (see the last observation to the next following species).

**17. *T. obliqua* SAY.** ♂ ♀. (Tab. XI, f. 14.)—Flava, thoracis dorso postice atro-bipunctato, abdomine maris utrinque punctis atris in seriem dispositis quatuor, foeminae quinque notato, alae hyalinae, fasciis quatuor obliquis flavis et fusco-marginatis variegatae.

Yellow, with two deep-black punctiform dots on the posterior end of the thoracic dorsum, and on each side of the abdomen with rows of four similar dots in the male, and of five in the female; wings hyaline with four oblique, yellow crossbands, bordered with brown. Long. corp. 0.12—0.14; long. al. 0.13—0.14.

SYN. *Trypeta obliqua* SAY, Journ. Acad. Phil., VI, p. 186, 3.

*Trypeta obliqua* LOEW, Monogr., I, p. 99.

Say's description, with the additions given by Baron Osten-Sacken in these Monographs, Vol. I, p. 100, is sufficient for the identification of this pretty species. I would only add that in all the specimens examined by me, the males had four, the females five black dots on each side of the abdomen, and that all the specimens showed three deep black dots on the posterior part of the pleuræ; one immediately above the middle coxæ, the second above the hind ones, the third crescent-shaped, surrounding the basis of the stem of the halteres. Ovipositor about as long as the last two abdominal segments taken together, of the same coloring as the abdomen, very little infuscated at the end.

*Hab.* Indiana (Say); Pennsylvania (Osten-Sacken; on *Vernonia* in August); Texas (Belfrage).

*Observation 1.*—I am in doubt whether *Trypeta obliqua* also occurs in Brazil. The specimens generally labelled with this name in the collections, seem to belong to a different, although closely resembling species. They are usually somewhat larger than the North American specimens of *T. obliqua* Say; the pile on the whole body as well as the bristles on the third vein are somewhat longer; moreover, I notice on the sides of the abdomen of the male only two, of the female only three black dots; not fully colored specimens do not show any trace of the three black spots on the posterior part of the pleuræ, as they occur in *T. obliqua*; better colored specimens have a trace of the two posterior spots

only. In all other respects the agreement with *T. obliqua* is so great, that I do not dare to decide whether this Brazilian *Trypeta* is a distinct species or merely a variety of *T. obliqua*. It is not to be confounded with another Brazilian species, which is considerably larger, and of which I possess only the female. I let its description follow :—

**T. biseriata** n. sp. ♀.—*Trypetæ obliquæ* Say, quam magnitudine superat, simillima, sed capite proportionē majore, pilis totius corporis longioribus, pleuris immaculatis, alis minus pure hyalinis et cellulâ basali secundâ non hyalinâ, sed luteâ distincta.

Very like *T. obliqua* Say, but larger, with a comparatively larger head, longer pile on the whole body and unspotted pleuræ; wings of a less pure hyaline; second basal cell not colorless, but yellow. Long. corp. 0.17—0.18; long. al. 0.22—0.23.

Coloring and picture of the body similar to the female of *T. obliqua* Say, especially the two black dots upon the posterior portion of the thoracic dorsum and the five black dots upon each side of the abdomen; the black dots which *T. obliqua* has on the posterior portion of the pleuræ are entirely wanting here. The pile on the whole body is much longer, black upon the abdomen and especially striking upon the posterior edge of its first segment. The head is proportionally larger. The wings are comparatively somewhat broader and their surface, especially towards the posterior margin, is a little more dusky; the first and third longitudinal veins are beset with much longer bristles; the venation agrees, in the main, with that of *T. obliqua*; the picture of the wings also is very much alike, only the dark portions of it are less brownish-black and more diluted; the last two yellow bands are much less extensive; the second basal cell, which in *T. obliqua* is always hyaline, is altogether tinged with clay-yellow here. The ovipositor is about as long as the last two abdominal segments taken together, and is broadly truncate at the end.

*Hab.* Brasil.

*Observation 2.*—*Trypeta discolor* and *obliqua* Say, as well as the *T. biseriata* described in the preceding observation, are three very closely resembling species, agreeing in all the principal characters. They have no immediate relatives in Europe, with which they could be placed in the same genus; however, they are somewhat allied to *Edaspis*, as they have the direction of the crossveins and the course of the second crossband, covering the crossveins, in common with that group; in almost all the other important characters they show striking differences. I propose, therefore, the formation of a new genus for them, which I call *Pla-*

*giotoma*. The characters of this genus are as follows: In the structure of the head and of its parts and of the scutellum it resembles *Acidia* very much; the scutellum, provided with four bristles, is convex, without appearing swollen; the shape of the abdomen likewise reminds one of the species of *Acidia*; the ovipositor also has a similar structure, but is longer than in *Acidia*, rather broadly truncate at the end. Wings rather large, with a distinctly convex anterior margin; the first and third veins are distinctly bristly; the crossveins are very much approximated; their posterior end is nearer to the apex of the wing than the anterior one; the last section of the fourth vein forms a bow, the convex side of which is turned towards the anterior margin, so that it distinctly diverges at the end from the end of the third vein, which is much more straight; the posterior corner of the anal cell is drawn out in an acute point. The picture of the wings consists of four very oblique crossbands, the second of which runs over both crossveins; the last crossband forms a border along the apex of the wing.

**18. *T. palposa* Lw. ♂.** (Tab. X, f. 9.)—Lutea, abdomine punctorum nigrorum seriebus quatuor picto; alæ hyalinæ, fasciis tribus sordide luteis, primâ et secundâ perpendicularibus et parallelis, tertiâ marginali et inde a præcedente usque ad cellulâ posterioris secundæ apicem pertinentæ.

Clay-yellow, with four longitudinal rows of black dots on the abdomen; wings hyaline with three crossbands of a dingy clay-yellow, the first two of which are perpendicular and parallel; the third forms a border along the margin of the wing, reaching from the second band to the end of the second posterior cell. Long. corp. 0.26—0.27; long. al. 0.26.

**SYN.** *Trypeta palposa* Loew, Monogr. I, p. 74, 8. Tab. II, f. 9.

The quoted description, drawn from an indifferently preserved male, is sufficient for the identification of the species. I will only notice here that in the first line of that description, *Cederh.*, must be read, instead of *Cederli*, and that on page 75, line 4, the expression "the edge of the tip" means the third band, which forms a border along the last portion of the anterior margin and the apex of the wing.

*Hab.* Northern Wisconsin River (Kennicott).

*Observation.*—The present species is a type of the genus *Trypeta*, in the narrower sense, as defined in my Monograph of the European *Trypetina*. It belongs in the group of those

species which are related to *Trypeta arctii* Deg. and are abundantly represented in the European fauna. The most salient features of *Trypeta* sensu strict. are also the shape of the head, as well as the size and position of the rather broad palpi, which reach beyond the somewhat projecting anterior edge of the mouth. As these characters are easier to perceive than to describe in a few words, the present species deserves to be studied as a type of *Trypeta* in the narrower sense.

**19. *T. florescentiae* LIN.** ♂ ♀.—Ex flavo-virescens, thoracis disco nigricante, postice breviter bifido, maculis alarum hyalinarum quatuor nigris, intermediis fere contiguis, aut in fasciam perpendicularem confluentibus.

Yellowish-green; the blackish color of the thoracic dorsum which does not reach the lateral margin is slightly bifid posteriorly; the hyaline wings show four black spots, the two intermediate ones of which are almost contiguous, or confluent in a perpendicular crossband. Long. corp. ♂ 0.17, ♀ cum terebrā 0.20—0.21; long. al. 0.18.

**SYN.** *Musca florescentiae* LINNÆ, Syst. Nat. X, p. 601, 99.!

*Musca ruficauda* FABRICIUS, Ent. Syst. IV, p. 353, 169.

*Tephritis punctata* FALLEN, Act. Holm. 1814, p. 167, 12.

*Trypeta florescentiae* MEIGEN, Syst. Besch. V, p. 321. Tab. XLVIII, f. 3.

*Trypeta florescentiae* LOEW, Germar's Zeitschr. V, p. 338. Tab. I, f. 15.

*Trypeta florescentiae* LOEW, Europ. Bohrd. 59, 11. Tab. IX, f. 2.

Pale yellowish-green. Front, third antennal joint, and palpi usually of a much more vivid yellow. Eyes very much rounded. Face short, excavated; the anterior edge of the mouth distinctly projecting. Antennæ rather short; the longer bristle upon the second antennal joint but little conspicuous. Palpi comparatively long, reaching beyond the anterior edge of the oral opening. Thoracic dorsum blackish, with the exception, however, of the lateral border and of a cuneiform beginning of a middle stripe, starting from the posterior end, and which renders the black coloring bifid posteriorly. Scutellum immaculate, except on the under side of the lateral angles, and provided with four bristles. Metathorax black. Pleuræ more or less infuscated, sometimes rather blackish-brown, with a yellowish-green longitudinal stripe upon their upper side and another across the middle. Abdomen with four rows of conspicuous black spots; its pile, in both sexes, is usually whitish; however, along the posterior margin of the single segments, some black hairs are usually inserted; the last

segment of the abdomen of the male is often clothed with altogether black pile. Ovipositor red or brownish-red; at its basis two, sometimes confluent, black spots are visible; the extreme tip also is usually black; in length, the ovipositor hardly exceeds the last two abdominal segments; it is not very much attenuated towards the end and is beset with black or blackish pile. Feet altogether pale clay-yellow. Wings hyaline, with a black or rather blackish picture; the outlines of this picture are surrounded, in immature specimens, with a purer hyaline, in riper ones, with a more whitish-hyaline hue; beyond this pellucid border, the former kind of specimens show an indistinct, the latter ones a more pronounced gray shade; the picture of the wings consists of four spots, very variable as to their size and the intensity of their coloring; the first spot covers the stigma and usually reaches only as far as the second longitudinal vein; the second begins near the anterior margin immediately above the posterior crossvein, thus leaving the tip of the marginal cell uncovered; it becomes narrower and more faint posteriorly, thus reaching more or less completely the anterior end of the posterior crossvein; the third spot usually appears as a broad border along the posterior crossvein and is more or less coalescent with the second, forming a perpendicular crossband; the fourth spot lies upon the apex of the wing and is more or less triangular, as its inner limit runs perpendicularly from the tip of the second vein to the fourth vein, which limits it posteriorly; around the small crossvein and in the environs of the root of the third vein there is a more or less apparent, sometimes very distinct infuscation.

*Hab.* Canada (Mr. Provancher); common also in all Europe, where the larva inhabits the flower-heads of different species of *Cirsium*.

*Observation 1.*—Europe possesses, besides the variety of this species, discovered by Mr. Provancher in Canada, another form, distinguished by considerably larger and darker spots on the wings. Specimens of both varieties might easily be taken for different species; nevertheless, passages from one form to the other occur in the picture of the wings, and I am not able to discover between both the slightest plastic difference. In Germar's *Zeitschrift*, Part V, Tab. I, f. 15, I have figured a wing of the first variety. An extreme instance of the second variety is figured in my *Monograph: die Europäischen Bohrfliegen*, Tab.

IX, f. 2. Meigen's figure (Syst. Besch. V, Tab. XLVIII, f. 3) likewise represents the latter variety. It is probable that it will also be found in America.

*Observation 2.*—The present species, as well as the preceding, belongs to the genus *Trypeta* in the narrower sense.

**20. *T. polita* Loew.** ♀. (Tab. X, f. 12.)—Atra, nitida, scutello tumido concolore, capite præter faciem exalbidam pedibusque lutescentibus, alæ albido-hyalinæ, maculâ basali atrâ, fasciisque tribus latis simis fusco-nigris, venis transversis valde approximatis.

Deep black, shining; the tumid scutellum is concolorous; the head, with the exception of the whitish face, and the feet clay-yellowish; the whitish-hyaline wings have a deep black spot upon the basis and three very broad deep black crossbands; the crossveins are very much approximated. Long. corp. ♀ 0.17—0.18, cum terebrâ 0.22; long. al. 0.17—0.18.

*Syn. Trypeta polita* Loew, Monogr. Vol. I, p. 77. Tab. II, f. 12.

*Hab.* Mississippi (Schaum); Washington, D. C.; New York; Connecticut (O. S.).<sup>1</sup>

*Observation.*—I have nothing to add to the above-quoted description. The systematic position of this species will be discussed in the second remark to the following species.

**21. *T. atra* Lw.** ♂ ♀. (Tab. XI, f. 17.)—Atra, nitida, scutello tumido, concolore, capite præter faciem albidam, femorum apice, tibiis tarsisque luteis; alæ albido-hyalinæ, maculâ basali atrâ, fasciisque tribus latis fusco-atris, venis transversis valde approximatis.

Deep black, shining; the tumid scutellum concolorous; the head, with the exception of the whitish face, the tip of the femora, the tibiæ, and the tarsi clay-yellow; the whitish-hyaline wings have a deep black spot upon the basis and three broad, deep brownish-black crossbands; crossveins very approximate. Long. corp. ♂ 0.12—0.13, ♀ 0.13—0.14, cum terebrâ 0.17—0.18; long. al. 0.13—0.15.

*Syn. Trypeta atra* Loew, Berl. Entom. Zeitschr. VI, p. 219.

*Trypeta atra* Loew, Dipt. Amer. Sept. Cent. II, No. 89.

Deep black, shining. Front rather broad, of a vivid reddish-yellow; the ocellar triangle, as well as the little stripes descending from the vertex and bearing the uppermost bristles of the vertex, black, with a whitish-gray pollen; anteriorly, on the lateral

<sup>1</sup> This species produces the galls on *Solidago*, described by me in the Trans. Amer. Entomol. Soc. Vol. II, p. 301. O. S.

margin of the front there are on each side two black bristles. Antennæ yellow; the blackish arista distinctly incrassated at the basis. Face whitish; the anterior oral margin not at all projecting. Cheeks whitish, under the eyes with a more or less brownish-red spot. Oral opening rather round. Proboscis short. Palpi short, but broad, pale yellowish, with some short, whitish pile. The upper and middle part of the occiput for the most part black. The ordinary frontal bristles and some of the bristles on the cheeks are black; otherwise the pile upon the head consists of very scattered, bristle-like, or stubble-shaped whitish hairs, which easily drop off. The upper side of the thorax is shining black, very convex; besides the usual black bristles, it shows white, bristle-like hairs, which border the denuded stripes. Metathorax with white pollen; its lower part shining black; pleuræ shining black, with some rare, stiff, bristle-like white hairs. Abdomen short, shining black, at the root of the single segments only somewhat glossy, in consequence of a very thin grayish pollen. The scattered, very rough pile on the abdomen is whitish; only the posterior margin of the segments and partly also the middle line of the abdomen, have black hairs. Ovipositor stout, conical, not flattened, shining black, beset with black pile, somewhat longer than the last three abdominal segments taken together. Coxæ and femora shining black, only the front femora on the under side with a few black bristles; the tip of the femora, the tibiæ, and the tarsi brownish-yellow or more reddish-yellow. Wings whitish-hyaline, short and rather broad, with very much approximated and very perpendicular crossveins. The extreme root of the wings is whitish; next follows a rather large and almost deep black spot, reaching as far as the axillary excision, and not much beyond the basis of the small basal cells; the first two crossbands, which follow next, are connected near the anterior margin and strongly diverge towards the posterior one; the first of them is even a little broader than the second and altogether black, while the inner part of the second is partly brown; the third band is separated from the second, near the anterior margin, only by a very narrow hyaline spot; it borders the apex of the wing far beyond the tip of the fourth longitudinal vein, but actually touches the margin of the wing only beyond the tip of the third vein; its inner portion is brown anteriorly.

*Hab.* Mexico (coll. Winth.); New York (Osten-Sacken).

*Observation 1.*—The appended figure of the wing is taken from a Mexican specimen. The specimens which I received from New York differ from the former in being a little larger and in the circumstance that the face is somewhat more uneven; perhaps only in consequence of a stronger desiccation. Moreover, the last section of the fourth vein is a little less curved, and the posterior end of the first crossband is prolonged further along the margin towards the posterior corner of the wing. In all other respects the agreement is such that I cannot believe *T. atra* to be a different species. From *T. polita* the present species is easily distinguished by the much greater divergency of the second and third crossbands on the wings, by the absence of the pale gray border of the crossbands, which is always perceptible in *T. polita*, and by the black coloring of the femora; moreover, the anterior part of the lateral border of the front bears only two bristles in *T. atra*, while there are three in *T. polita*. The Brazilian species *T. nigerrima* Loew is very much like *T. atra*, nevertheless they are easily distinguished. In order to facilitate the comparison, I let the description of this species follow.

**T. nigerrima** Loew. ♀. (Tab. XI, f. 18.)—*Atra*, nitida, scutello tumido concolore, thoracis maculis lateralibus utrinque binis velutinis, abdomine fasciis albido-pollinosi ornato, capite flavo, pedibus ex-ferrugineo luteis, femoribus tamen posterioribus anticorumque liturâ ex-fusco nigris; alæ albido-hyalinæ, maculâ basali atrâ, fasciisque tribus fusco-atris, primâ latissimâ, reliquis minus latis, venis transversis valde approximatis.

Deep black, shining; the tumid scutellum concolorous; thoracic dorsum with two velvet black spots on each side; abdomen with crossbands of white pollen; head yellow; feet brownish-yellow, the posterior femora and a stripe on the front femora brownish-black; wings whitish-hyaline with a deep black spot on the basis and with three black crossbands, the first of which is very broad, the two others less so; crossveins very much approximated. Long. corp. 0.12—0.13; long. al. 0.12—0.13.

**SYN.** *Trypeta nigerrima* Loew, Berl. Ent. Zeitschr. VI, p. 219.

*Trypeta nigerrima* Loew, Dipt. Amer. Sept. Cent. II, p. 89.

Shining black. Head whitish-yellow; the rather narrow and steep front much darker yellow; the frontal bristles black. Antennæ dark yellow, rather large, especially the elongated third joint, which has a rather sharp anterior corner. Arista apparently bare, rather slender, not incrassated towards its root, of a pale color. Face but very little excavated, and very



little retreating; the anterior edge of the mouth distinctly projecting in the profile. Eyes elongated. Cheeks somewhat broad, with an infuscated spot near the inferior corner of the eye, and with white pile. Oral opening small, rounded. The rather broad palpi yellowish, beset with whitish pile. The short and not geniculate proboscis dark brown. Thorax shining black, with a metallic lustre in the middle; upon its lateral border, on each side, there are two large, opaque, velvet black spots, separated by the origin of the transverse suture, which is tinged with yellow. The usual bristles are black; the number of pairs which were inserted on the thoracic dorsum cannot well be ascertained. Moreover, the surface of the thoracic dorsum shows remains of stiff, yellowish hairs, which seem to have bordered the broad, bare stripes and to have also been inserted on the posterior part of the broad middle line. Scutellum turgid, shining black, with four bristles. The upper part of the metathorax is black, as in most of the allied species; the lower portion is covered with white pollen, which does not quite reach its lower margin. Femora with whitish pollen and white hairs; the humeral corner, as well as a little stripe behind it, near the upper margin, are velvet black. Abdomen shining black; a thin whitish pollen covers the whole anterior part of the first segment, forms, upon the first, second, and third segments, a band along their posterior margin which is perceptibly expanded and sharply emarginate in the middle; the posterior margin of the fourth segment has a similar, although narrower, band. The scattered pile on the abdomen is black, gray at its basis, in part yellowish-white upon the last segment. The flat, shining black ovipositor is about as long as the three last abdominal segments taken together, and is beset with delicate, black pile. Feet reddish-yellow, the middle and hind femora, with the exception of the extreme root and of the tip, brownish-black; the front femora have a brownish-black stripe upon their upper side. Wings broad, the apex but little rounded, hyaline, somewhat whitish; at their basis there is a large black spot, reaching into the basal cells; besides, there are three black cross-bands, entirely coalescent at the anterior margin of the wing and diverging posteriorly; the first of them, which is by far the broadest and is rather perpendicular, runs from the stigma, over the basis of the discal and of the third posterior cells, towards the posterior margin of the wing; the second band is the narrowest, and runs from the stigma over both crossveins, and hence, obliquely, towards the posterior margin; the third band starts from the stigma and follows the anterior margin and the apex, as far as the tip of the fourth vein, but, nevertheless, remains separated from the costal vein by a narrow, irregular, hyaline interval, which extends almost to its very end; near the submarginal cell, this interval is a little expanded and includes a punctiform dot, placed near the third vein; the first and second longitudinal veins are a little more distant from the anterior margin than in most of the related species; both crossveins are very approximate; the third longitudinal vein is beset with short bristles.

*Hab.* Brazil (coll. Winthelm).

*Observation 2.*—*T. polita* and *atra*, as well as *T. nigerrima* are closely related in their organization. Among the European *Trypetæ*, the species of the genus *Oedaspis* stand next to them, especially when this genus is confined to *Oedaspis multifasciata* Loew and its next congeners, at the exclusion of *Oed. Wiedemanni* Meig. and *vesuviana* Costa. The American species differ from the above-mentioned European ones (*multifasciata* Lw., *dichotoma* Lw., and *fissa* Loew) in several characters, which they have in common; the most striking of these are: 1. The rather long, stubble-shaped pile; 2. The longer and more pointed ovipositor; 3. The different picture of the wings. The latter difference will be sufficiently apparent, when the figures which I give of the wings of *polita*, *atra*, and *nigerrima* are compared with the figures of the wing of *T. multifasciata*, produced in the *Europ. Bohrfliegen*, Tab. VI, f. 2. The pictures of *T. fissa* and *dichotoma* agree, in their general features, with that of *multifasciata*. These differences of the three North American species are not of sufficient importance to require the establishment of a new genus for them, and I have not the slightest hesitation in placing them in the genus *Oedaspis*, in the narrower sense, defined above.

**22. *T. gibba* n. sp.** ♀.—*Atra*, nitida, scutello tumido, concolore, facie albicante, pedibus subbadiis; alæ albido-hyalinæ, maculâ basali atrâ fascisque tribus latis fusco-atris, venis transversis valde approximatis, cellulâ marginali per venulam transversalem adventitiâ dissectâ.

Deep black, shining; the turgid scutellum of the same color; face whitish; feet chestnut-brownish; wings whitish-hyaline, with a deep black spot at the basis, and with three brownish-black crossbands, very much approximated crossveins, and a supernumerary crossvein dividing the marginal cell. Long. corp. 0.13, cum terebrâ 0.17; long. al. 0.14—0.15.

Very like the three preceding species and closely allied to them, nevertheless, distinguished in some peculiar plastic characters. Deep black, shining. Front conspicuously broad, of an opaque, dirty, brownish, more reddish-brown on the sides; the four bristles on the posterior part of the vertex, the bristles near the ocelli, the four bristles crowded together and inserted on the small stripes running from the vertex towards the front, finally two bristles on each side, near the lateral frontal border, are all black; the latter two are inserted, one very high up, the other very low

down, so that the distance between them is remarkably large. Otherwise the head is beset with almost bristle-like white stubble-shaped pile. The very large and sharply defined frontal lunule, the face, including the cheeks, and the lower half of the occiput are whitish; the upper part of the latter blackish, although covered with whitish pollen. The perpendicular diameter of the eyes has about double the length of the horizontal one; nevertheless, the cheeks are remarkably broad; a brownish stripe runs from the lower corner of the eye perpendicularly towards the edge of the mouth; the hairs, inserted upon its lower end, are brownish-black or black. The first two antennal joints are clay-yellowish; the third joint is dark brown, rather large, short-oval in outline; arista bare, not incrassated at the basis, black. Oral opening larger than in the preceding species; its transverse diameter comparatively larger; proboscis and palpi short, brown. The very convex thorax and the turgid scutellum are deep black, shining, with a very weak metallic, violet reflection; the remarkably broad lateral stripes and the anterior end of the broad middle stripe are bare. The lateral stripes are bordered with coarse, yellowish, stubble-shaped pile, and the posterior two-thirds of the middle stripe, besides being covered with white pollen, are densely beset with similar hairs. The ordinary bristles of the thoracic dorsum are black, and more numerous than usual, as there are four pairs of them along the longitudinal middle line, the anterior pair being inserted immediately in front of the transverse suture. The shining black metathorax has, under the swelling lying immediately under the scutellum, a crossband of thick white pollen. The pleuræ show upon the greater part of their upper half, a thin, whitish-gray pollen, and are everywhere beset with stubble-like white hairs. The abdomen seems to be covered everywhere with a thin gray dust, which is somewhat more dense and more whitish-gray upon the posterior border of the single segments; its rather long stubble-like pile is white. The comparatively long and pointed ovipositor is deep black, shining, and beset with short, fine, black pile. Feet chestnut-brownish. Wings short, rather broad in proportion to their length; the altogether black venation is very similar to that of the immediately preceding species, except that the comparatively broad marginal cell is divided in two halves by a perpendicular crossvein, which touches the costa at a point perceptibly nearer

from the tip of the first than from that of the second vein. I take this crossvein to be a constant character of the species, as it exists on both wings of my specimen, and as several closely allied *Trypetidae*, for instance *Gonygl. Wiedemanni* and *Caprom. vesuviana*, have it likewise, although incompletely developed. The picture of the wings is not unlike that of *T. atra*, in its design as well as in its coloring; the black spot upon the basis of the wings does not cover their extreme root, and extends, on the anterior margin, only very little beyond the humeral crossvein; it hardly reaches beyond the first longitudinal vein, and dissolves in several radiating points, which occupy the longitudinal middle of the marginal and of the three basal cells and almost come in contact (except the hindmost), with similar rays, meeting them from the opposite side and emitted by the first crossband; the first black crossband has almost the same position as in the three preceding species, but it is much narrower, especially towards its end, which reaches the posterior margin; its interior does not show any brownish tinge. The second band runs over both crossveins, exactly as it does in those three species, and is connected with the first on the anterior margin in the same manner as this is the case in *T. atra*; the stigma, lying within this connecting portion, is very short; the veins surrounding it have, on the inner side, a very narrow hyaline border; the interior of the second band is for the most part brownish. The last black band begins in the marginal cell somewhat beyond the supernumerary crossvein in this cell, and reaches some distance beyond the end of the fourth vein; as far as this vein, it is separated from the margin of the wing by a narrow hyaline border, which somewhat projects on the inside on the second and third veins; beyond the fourth vein the band comes in immediate contact with the margin of the wing; the inside of this band is brownish upon the anterior two-thirds of its course.

*Hab.* Texas (Belfrage).

*Observation.*—The differences between the present species and the three preceding ones are evident: they consist in an aberrant arrangement of the bristles of the front and of the thoracic dorsum, in the size and shape of the third antennal joint, and in the presence of the crossvein, dividing the marginal cell; nevertheless the agreement between those species in most of the other plastic characters, in the shape of the body and in the picture of the

wings, is convincing enough to remove all doubt as to its location in the genus *Edaspis*.

**23. *T. cingulata* Lw.** ♂ ♀. (Tab. X, f. 11.)—Nigra, capite pedibusque luteis, thoracis margine laterali scutelloque præter margines laterales et anticum dilute flavis, margine postico segmentorum abdominalium singulorum albido; alæ hyalinæ, maculâ parvâ apicis fasciisque quatuor fusco-nigris, harum duabus primis postice abbreviatis et liberis, duabus ultimis integris et antice conjunctis.

Black, head and feet clay-yellow; lateral border of the thorax and the scutellum, the latter with the exception of the anterior and lateral border, light yellow; abdominal segments whitish on the posterior border; wings hyaline; a small spot upon the apex and four crossbands brownish-black; the first two bands abbreviated posteriorly and not connected; the two posterior bands are entire and connected on the anterior margin. Long. corp. 0.14—0.22; long. al. 0.15—0.20.

SYN. *Trypeta cingulata* Loew, Monogr. I, 76. Tab. II, f. 11.

*Hab.* Middle States; Long Branch, N. J., in July (Osten-Sacken).

*Observation.*—The description given by me in the first part of these Monographs will easily help to identify this species. I have nothing to add to it, but must call attention to the great variation in the size of different specimens. The smallest ones which I possess, are without exception males. *T. cingulata* is closely allied to the European species of *Rhagoletis*, especially to *R. flavicincta* Loew; its systematic location is, therefore, not doubtful.

**24. *T. tabellaria* FITCH.** ♀.—Atra, capite, trochanteribus, tibiis tarsisque dilute luteis, thoracis margine laterali scutelloque præter margines laterales albis; segmentorum abdominalium singulorum margine postico exalbido; alæ pure hyalinæ, fasciis quatuor latis nigris, duabus primis postice, duabus ultimis antice coherentibus.

Deep black; head, second joint of the coxæ, tibiæ, and tarsi yellow; lateral border of the thorax and scutellum, with the exception of the anterior and the lateral borders, white; the posterior borders of the abdominal segments whitish; wings of a pure hyaline, with four broad, black crossbands, of which the first two are connected at the posterior, the last two at the anterior margin. Long. corp. 0.14—0.15; long. al. 0.14—0.15.

SYN. *Tephritis tabellaria* FITCH, First Report, p. 66.

Shining black; head yellowish; occiput black, with a pale yellow border; front broad, more bright yellow; only the spot upon which the ocelli are placed and the small, very narrow stripes, which run down from the vertex upon the front, are of a blackish color; the usual frontal bristles are black. Antennæ of a vivid ochre-yellow; their last joint is elongated-oval, obtuse at the end; arista blackish, with a hardly perceptible pubescence. Oral opening rather large, somewhat longer than broad; its anterior edge drawn up, but not projecting in the profile. Proboscis and palpi short, brown, the latter more clay-yellow towards the tip. The thoracic dorsum shows two longitudinal stripes, rather distant from each other, somewhat abbreviated posteriorly and covered with a thin, white pollen; upon the anterior part of the thoracic dorsum a similar pollen covers not only the interval between the stripes, but also extends beyond them. The whole of this pollen, however, is but little conspicuous and seems to be easily rubbed off. The humeral angle and a stripe running from it towards the root of the wings, are white. The flat scutellum, with the exception of its lateral border, has the same color. Metathorax without any pollen, altogether shining deep black. The usual bristles of the thorax and the four bristles of the scutellum are deep black. The other hairs on the thoracic dorsum are very short and delicate. Abdomen shining black; its first two segments are more opaque, being clothed with a brownish-black pollen. The first three segments, upon their posterior margin, have a crossband of a whitish pollen. The very short and soft hairs upon the abdomen are black; the paler crossbands upon the posterior border of the first three segments show some whitish hairs; the bristles upon the sides of the intermediate segments and upon the rather large last segment are black. Ovipositor shorter than the last abdominal segment, broad at the basis, much narrower at the end, shining black and with a black pubescence. Second coxal joint pale clay-yellowish. Femora black, only the extreme tip yellowish-brown; tibiæ and tarsi pale clay-yellowish; the former somewhat more brownish at the basis; the bristles upon the upper side of the hind tibiæ are remarkably short. Wings pure hyaline, almost whitish hyaline, with four entire black crossbands, the first of which of a medium breadth, the three others very broad. The first band is somewhat oblique and begins on the humeral cross-

vein; the second is perpendicular and begins on the stigma; both converge posteriorly and coalesce quite a distance from the posterior margin, so that the cuneiform hyaline space between them does not reach beyond the anterior angle of the basis of the third posterior cell. The third black band runs over the posterior crossvein and is parallel to the second band, so that between both there is a somewhat irregularly limited hyaline crossband, which is perceptibly dilated between the third longitudinal vein and the anterior margin; it reaches the latter immediately behind the stigma; the posterior end of the third band shows some inclination to coalesce with the second band near the posterior margin. The fourth band completely coalesces with the third between the costa and the second longitudinal vein, and follows the margin of the wing some distance beyond the end of the fourth longitudinal vein; between the tips of the second and fourth veins, however, there is a rather broad hyaline interval between it and the margin; beyond this point, it touches the margin completely.

*Hab.* New York (Dr. A. Fitch); Canada (Mr. Provancher).

*Observation.*—In the first volume of the Monographs I expressed the supposition that the *Tephritis tabellaria* of Fitch may not be a *Trypeta* at all, but an *Ortalida*; this supposition, however, proved to be erroneous; it is a *Trypetida*, belonging to the genus *Rhagoletis*.

**25. *T. pomonella* WALSH.** ♀.—Fusco-nigra, capite, trochanteribus, femorum apice, tibiis, tarsisque luteis, thoracis margine laterali, scutelloque præter margines laterales et anticum albis, abdominis colore in piceum vergente, segmentorum marginibus posticis confertim albido-pollinosi, terebrâ latissimâ, sed brevi; alæ hyalinæ, fasciis quatuor nigris, primâ subbasali, reliquis tribus integris, antice conjunctis, postice divergentibus.

Brownish-black; head, second joint of the coxæ, tip of the femora, tibiæ, and tarsi clay-yellowish; lateral margin of the thorax and scutellum, the latter with the exception of its basis and of its lateral margins, white; abdomen more pitch-brown, with crossbands of white pollen on the posterior margins of the segments; ovipositor very broad, but short; wings hyaline, with four black crossbands, the first of which lies near the basis, the last three are connected near the anterior margin and divergent towards the posterior one. Long. corp. 0.17, cum terebrâ 0.19; long. al. 0.17.

*Syn.* *Trypeta pomonella* WALSH, First Rep. Illin. etc., p. 29-33, f. 2.

I possess but a single specimen of this species. Its coloring is not fully developed, although otherwise its preservation is perfect. It is black, with a distinct brownish tinge; its abdomen is more pitch-brown and rather shining. Head pale yellowish, with a narrow dark yellow front and more ochre-yellow antennæ; the third joint of the latter is narrow and rather long, rounded at the end; the slender arista is dark brown, with a short, although distinctly discernible pubescence. The usual frontal bristles are black; behind the ocelli, however, near the lateral margin, two shorter, whitish bristles are placed. Oral opening large, broader than long. Palpi and proboscis pale yellowish, with a pale pubescence; the former do not project beyond the anterior edge of the mouth, the flaps of the latter somewhat prolonged. The thoracic dorsum shows four rather narrow longitudinal stripes, formed by a whitish pollen; these stripes, arranged in pairs, are confluent anteriorly; the outside stripes are moderately abbreviated before the posterior margin of the thorax; the inside ones reach only as far as the anterior pair of bristles, inserted upon the longitudinal middle of the thorax; each of the bristles of this pair is placed between the end of the corresponding inside stripe and the outside one; the inside stripes are separated by a broad dark interval, which shows the shining brownish-black color of the remainder of the thorax. When the thorax is viewed from the front side, the light falling in from behind, the pollinose stripes appear somewhat more broad; the interval between the inside stripes appears somewhat narrower and a little more opaque; at the same time, this point of view discloses upon the outside stripes and upon the margin of the inside ones, alongside of them, some short, snow-white pile, while the remaining pile of the thoracic dorsum is black. The humeral callosity and a stripe running from it to the root of the wing, is white. The rather flat scutellum is white, blackish on the sides and at the basis. The bristles of the thorax and the four bristles of the scutellum are black. The first four segments of the abdomen have each, on the posterior margin, a rather uniformly broad crossband, formed by whitish pollen; the last segment, which has no such band, is paler brown along the posterior margin. The comparatively scattered and not very short pile on the abdomen is black; it is white only on the pale crossband on the posterior part of the first segment. The bristles



on the sides of the middle and of the last segments are black. Ovipositor very short, about once and a half the length of the last abdominal segment, very conspicuously broad, not much attenuated towards the end, very broadly truncate and somewhat convex; its coloring is a shining brownish-black or black; the pubescence is black. In agreement with the unusual breadth of the ovipositor, the last abdominal segment is also very broad, which causes the whole abdomen to have a peculiar shape. The second coxal joint yellowish; posterior femora black with a clay-yellow tip; front femora clay-yellow, with a large, broad, brownish-black stripe upon the hind side; tibiæ and tarsi clay-yellowish, the tip of the latter dark brown. Hind tibiæ on the upper side beset with rather long bristles.

*Hab.* Illinois (Walsh); the larva, originally feeding upon the fruit of a *Cratægus*, is now frequently found upon the fruits of the apple-tree, which it damages.

*Observation.*—The next relatives of *T. pomonella* are found in a series of South American species, only a single one of which, as far as I know, has been previously described; it is to be found in Macquart's *Diptères Exotiques*, Suppl. IV, p. 288, Tab. XXVI, f. 15, under the name of *Urophora scutellaris*. It is not an *Urophora* however, and moreover, the name of *scutellaris* cannot be maintained, as Wiedemann has previously used it for another species. The species may, therefore, be called *Trypeta Macquartii*. Macquart's figure shows, that this Brazilian species differs in the picture of its wings from the species of *Rhagoletis* previously described, and that, in this respect, it is more like the species of *Acidia*. The structure of its body shows a corresponding approach to the species of this latter genus, while, on the other hand, coloring and picture of the body are most strikingly like those of *Rhagoletis*. As this species is also very like the North American *Rhagoletis* in the structure of its body, the question arises whether it is better to place it in the genus *Acidia* or in *Rhagoletis*. I prefer the latter course, because we thus facilitate the generic determination of the allied species. *Trypeta pomonella*, as has already been mentioned above, is among the number of such species, the picture of its wings being very like that of *T. Macquartii*. It is true that it differs not inconsiderably from *T. Macquartii* in the greater length of the third antennal joint, the considerable size and breadth of the oral opening, and

the strikingly large transverse diameter of the short ovipositor; but, like *Trypeta Macquartii*, it agrees with the true species of *Rhagoletis* in the coloring and in the picture of the body, so that I prefer, for the present, to leave it in that genus. It may be objected that, in this case, I lay a greater stress upon peculiarities of the coloring and mere differences of *habitus* than upon plastic characters. In answer to this objection I may state that I fully appreciate the value of plastic differences in matters of generic grouping of species, but that the knowledge of the exotic *Trypetæ*, as well as the existing descriptions of them, are not sufficient for their generic distribution upon plastic characters only. Most descriptions mention but very little about these characters, the more so as in most cases they have to be drawn from a few indifferently preserved specimens, which do not allow a sufficiently clear view of such characters. And thus it happens that peculiarities of coloring and other habitual characters become in many cases very useful for the generic distribution of exotic *Trypetæ*, especially in cases where the only available plastic characters are of a very delicate nature and hence more difficult to perceive. It is true that the exotic species thus treated are merely *grouped*, and not systematized; but this grouping in itself is a progress towards the determination of the species, and is one of the usual steps towards a systematic distribution.

**26. *T. insecta* Lw.** ♀. (Tab. X, f. 8.)—Thorace nigro, capite, abdomine pedibusque luteis, alarum nigrarum incisuris marginalibus, guttulisque inter venarum longitudinalium tertiam et quartam tribus vel quatuor pellucidis, venâ longitudinali tertiâ nudâ, setis scutelli duabus.

Thorax black; head, abdomen, and feet clay-yellow; wings black, with hyaline indentations along the margin and with three or four hyaline drops between the third and fourth veins; the third vein not bristly; scutellum with two bristles. Long. corp. 0.14; long. al. 0.14.

SYN. *Trypeta insecta* Loew, Monogr. I, p. 72. Tab. II, f. 8.

*Hab.* Cuba (Poey). [Hayti; P. R. Uhler.—O. S.]

*Observation 1.*—*T. insecta* belongs to the typical species of the genus *Aciura*, the scutellum of which bears only two bristles. The picture of the wings of this genus is characteristic.

*Observation 2.*—Another *Trypeta* of the same genus occurs in Brazil, which may be easily mistaken for *Trypeta insecta*. I prefer, therefore, to describe it here:—

**T. phœnicura** n. sp. ♂ ♀. (Tab. XI, f. 12.)—Nigra, capite pedibusque ochraceis, alarum nigrarum incisuris marginalibus guttulisque inter venas longitudinales tertiam et quartam tribus pellucidis, venâ longitudinali tertiâ nudâ, setis scutelli duabus.

♂. Abdomen ex ferrugineo rufum, segmento ultimo nigro.

♀. Abdomen nigrum, basi ferruginâ, terebrâ latâ læte aurantiacâ.

Black, head and feet ochreous-yellow; wings black, with hyaline indentations along the margin and with three hyaline drops between the third and fourth longitudinal veins; the third longitudinal vein is not bristly; the scutellum has two bristles.

♂. Abdomen ferruginous, its last segment black.

♀. Abdomen black, ferruginous at the basis; the broad ovipositor is of a vivid orange-yellow. Long. corp. ♂ 0.14, ♀ 0.15—0.16; long. al. 0.14.

Black; head of an impure ochre-yellow; the occiput alone mostly blackish; front narrow, especially anteriorly; frontal bristles black. Eyes very large, cheeks very narrow. Face short, concave; nevertheless, the anterior oral edge not projecting in the profile. The antennæ reach down to the oral edge; their third joint is rounded at the tip; the blackish arista is long and slender, apparently bare. Oral opening of medium size, rounded; proboscis not geniculate. The thorax and the two-bristly scutellum are black, their short pile yellowish-white, their bristles rather black; the somewhat rounded abdomen of the male is of a dirty ferruginous color (in living specimens its color may be purer); its last segment is black. The extent of the black color is greater in the female abdomen, the first segment, the basis of the second, and the anterior corners of the third alone, being ferruginous. The short pile of the abdomen is paler, almost yellowish in the male, somewhat brown in the female; on the posterior border of the last segment of the abdomen of the female there are some black hairs. The flattened, comparatively broad ovipositor, attenuated towards its end, has a shining surface; its color is a very bright orange-yellow, the tip alone shows a narrow black border; its short pubescence is pale. Coxæ and feet ochreous-yellow; the extreme tip of the posterior femora is somewhat blackish. Wings comparatively long and narrow, towards the end somewhat less broad and less obtuse than those of *T. insecta*, black, with a hyaline picture; near the costa, anterior to the stigma, there are three small hyaline spots, the first anterior to the humeral crossvein, the two others in the costal cell; immediately beyond the stigma, which is altogether black, there are two conspicuous triangular hyaline spots, which, with their pointed end, do not quite reach the third longitudinal vein; on the posterior margin of the wing there are six hyaline indentations, the last of which alone ends in a point; the first two are connected with the almost hyaline posterior angle of the wing, reach as far as the fifth longitudinal vein, and are separated by a much broader black band than the other indentations; the two following indentations cross beyond the fifth vein, the first below the

small crossvein, the second immediately before the end of the discal cell; the fifth indentation follows the outer side of the great crossvein (which runs obliquely backwards); the sixth, separated from the preceding by a black band of moderate breadth, is almost triangular; the three small hyaline dots between the third and fourth veins lie, the first under, the stigma, the second between the two crossveins, near the fourth vein, the third above the last of the hyaline excisions along the posterior margin.

*Hab.* Brazil.

The coloring of the abdomen of *T. insecta* and *phœnicura* seems to be somewhat variable, and hence not to be relied on as a specific character; the more marked are the differences in the outline and picture of the wings.

**27. *T. pœcilogastra* n. sp. ♂.**—Lutea, scutello setis sex instructo, abdomine nigro-variegato, alis latis fuscis, inæqualiter limpido-guttatis, venisque longitudinalibus primâ, terciâ et quintâ confertim nigro-setosis.

Clay-yellow, scutellum with six bristles, abdomen variegated with black; wings broad, blackish-brown, with unequally distributed hyaline drops; the first, third, and fifth longitudinal veins densely beset with black bristles. Long. corp. 0.21; long. al. 0.24.

Clay-yellow; the color of head and antennæ more ochre-yellow; the last joint of the latter elongated, rounded at the tip; the long brown arista beset with a very short pubescence. The face is rather retreating nearly as far as the vicinity of the anterior edge of the mouth; the latter is somewhat turned upwards and abruptly projecting when seen in profile. The vertical diameter of the eyes has double the length of the horizontal one; hence, the cheeks are very narrow. Proboscis tumid; palpi rather broad and short, although they project a little beyond the anterior edge of the mouth. The usual frontal bristles are black. The two pairs of bristles on the middle line of the thoracic dorsum are weak and of a blackish-brown color, like the other thoracic bristles; the anterior pair is at an unusual distance behind the transverse suture. Scutellum rather flat, with six brown bristles. Metathorax with two brown longitudinal stripes. Abdomen with a complicated black picture, the only visible portions of the ground color being an uninterrupted middle line of almost trapezoidal spots, and on both sides of it, two rows of other spots; the spots of the outer row lie on the anterior angles of the single segments; those of the inner row on the anterior

borders of the segments. Feet pale clay-yellowish. Wings broad, blackish-brown, with large and small hyaline dots, unequally distributed; the costal cell is pale brown between the extreme basis and a trifle beyond the humeral crossvein; next follows upon the costa a square brown spot, and then a square hyaline space, somewhat encroaching upon the stigmatical cell, so as to include the end of the auxiliary vein, which runs perpendicularly towards the margin of the wing; the stigmatical cell is otherwise tinged with blackish-brown and has, close to the anterior margin, two hyaline drops; immediately beyond the tip of the first longitudinal vein, near the anterior margin, there is a hyaline drop, reaching as far as the second longitudinal vein, the largest in the whole picture of the wing; in the vicinity of the apex of the wing the drops are larger than in the middle and more close together; so that a row of dots, reaching from the tip of the second vein to the posterior angle of the second posterior cell, and moreover four dots along the margin of the wing, may be discerned; among the latter, the first lies in the submarginal cell and is connected with a little drop behind the third vein; the second lies at the extreme tip of the wing; the last two in the second posterior cell; a second group of larger drops lies in the third posterior cell, immediately below the stigma; it consists of four drops, between which the black ground color is more or less faint, and of two other drops on the anterior side of the fifth vein; between this group of drops and the fifth longitudinal vein, there is, near the margin of the wing, a single larger drop; the posterior angle of the wing is brownish-gray, with several rather large limpid drops; the middle of the wing shows only small and isolated drops. The first, third, and fifth longitudinal veins are very closely beset with rather strong bristles; the second is strongly curved; the third and fourth diverge towards their end; the small crossvein is but little beyond the middle of the very broad discal cell, and the posterior crossvein has a very steep position; the anal cell is drawn out in a narrow and very long lobe.

*Hab.* Cuba (Gundlach).

*Observation.*—The six bristles upon the scutellum, as well as the dense bristles upon the first, third, and fifth longitudinal veins, distinguish *T. pæcilogastra* from all the following species, provided with a reticulate picture of the wings. It is very

closely allied to the species of *Hexachæta*, in which, however, as far as I know them, the fifth vein has bristles upon the basis only, while in the present species the bristles almost reach to the tip. For this reason, as well as on account of the different character of the picture of the wings, I do not deem it convenient to place it in the genus *Hexachæta*. Whether Mr. Saunders's genus *Dasyneura* would better answer for it, I am unable to say, as I have not been able to procure the publication which contains it. For the present therefore I set this species up as the type of a new genus, which I call *Blepharoneura*.

**28. *T. testudinea* n. sp.** (Tab. XI, f. 13.)—Ex luteo fusca, capite, thoracis dorso, pedibusque luteis, terebrâ duobus ultimis abdominis segmentis semel sumtis paulo longiore; alæ valde dilatatæ, e nigro fusca, strigis duabus hyalinis inde a margine cellulæ posterioris secundæ usque ad venam longitudinalem tertiam ascendentibus, primo limbi costalis dimidio grosse nigro maculato, disco alarum guttulis minutis pellucidis confertim asperso.

Yellowish-brown, head, thoracic dorsum, and feet clay-yellow; the ovipositor only a little longer than the last two abdominal segments taken together; wings very broad, blackish-brown; two hyaline indentations reach from the posterior side of the second posterior cell to the third longitudinal vein; the anterior half of the region along the costa shows a number of large, black spots; the central portion of the wing is occupied by many small, hyaline drops. Long. corp. cum terebrâ 0.21; long. al. 0.19.

A species very much resembling the *T. latipennis* Wied., but differing in the smaller size and the less minute dots on the central portion of the wing. The coloring of the body is yellowish-brown, but may be somewhat darker in fully colored specimens. The ground color of a great part of the upper side of the thorax is blackish, but very much concealed under a thick clay-yellow pollen. Front opaque, of a moderate breadth, still narrower anteriorly; the usual frontal bristles are brown. Eyes large, elongated; cheeks very narrow, with much pile; face short, descending rather perpendicularly, but distinctly excavated under the antennæ; the anterior edge of the mouth not projecting. Antennæ ochre-yellow, of a medium length, but, owing to the shortness of the face, reaching to the anterior edge of the mouth; the third joint has a rather rounded anterior corner; the moderately long arista thin and bare. The middle of the thoracic

dorsum shows traces of a pair of bristles. Scutellum but little convex, provided with four bristles. Metathorax blackish with a grayish-yellow pollen. The color of the pleuræ, in the described specimen, does not differ much from that of the remainder of the body; it seems, nevertheless, that, in more fully colored specimens, a considerable portion of the pleuræ may be blackish; they are thickly clothed with a clay-yellow pollen; the pile and the bristles upon them, like those on thorax and scutellum, are yellowish-brown. The abdomen shows a trace of four dark longitudinal stripes, formed by very much faded blackish spots; the pile upon it is somewhat shorter and rather blackish upon the anterior half of the single segments; upon their posterior half, it is somewhat longer and almost whitish; yet the long bristles on the posterior border of the last segment are blackish-brown. The flat ovipositor, which in the allied *T. latipennis* Wied. equals the last four abdominal segments in length, is but a little longer here than the last two segments taken together; it is of the same color with the abdomen, somewhat blackened at the root and tip, and beset everywhere with short blackish pile. Feet brownish-ochre yellow. Wings very broad, very like those of *T. latipennis* in outline, venation, and picture; proportionally, however, they are not quite as broad and not quite as convex on the anterior margin; upon the apical third of the wing there are three cross-bands, connected anteriorly and separated by narrow, hyaline intervals, beginning at the posterior margin; the first band is contiguous, on its outer side, to the posterior crossvein, and expands across it near its posterior end; the second runs across the middle of the second posterior cell, the third borders the apex of the wing. The remaining portion of the surface of the wing, beyond the second longitudinal vein, has a somewhat darker brownish tinge, and is covered with a multitude of small hyaline drops, which partly coalesce into longitudinal rows, and in some places, as at both ends of the small crossvein and here and there on the longitudinal veins, leave unbroken brown spots. Upon the posterior margin, there is a broad brown border, bearing a few larger, but not very well-defined drops, which are also less hyaline than those of the centre of the wing; on the posterior angle of the wing the border is somewhat faint. The brownish-black stigma coalesces with a spot of the same color immediately behind it, which spot crosses but little the second longitudinal

vein; two large spots of the same color lie in the exterior costal cell and fill out a large portion of it; a double spot of the same color is in the marginal cell immediately beyond the stigma; finally, there are two large spots of the same kind on the second longitudinal vein, the one upon its root, the other below the double spot in the marginal cell. The basis of the exterior costal cell is irregularly reticulate with very small drops. A small hyaline spot is situated between the double spot of the marginal cell and the end of this cell, filled out by the common origin of the three crossbands which occupy the apex of the wing. The third longitudinal vein is distinctly bristly, gently curved forward before its end and as gently backwards; posterior crossvein long, but not as long as in *T. latipennis* Wied.

*Hab.* Cuba (Otto); in the Berlin Museum.

*Observation.*—The present species forms, with *T. latipennis* Wied. and a group of related species from South America, an easily recognizable genus, very well characterized by the breadth of its large wings, their outline, which reminds of *Phasia*, and their peculiar picture. These species also have the structure of the head and the bristly third vein in common. I adopt for this genus, apparently exclusively American, the name of *Acrotænia*, in allusion to the most striking peculiarity of the picture of the wings.

**29. *T. sparsa* Wied.** ♂ ♀. (Tab. X, f. 13.)—*Fusca*, alæ latissimæ, subrotundatæ, nigræ, albido-guttulatæ, apice albido-marginato ornatæ.

Brown; wings very broad, almost round, black, with whitish drops, and the apex margined with white. Long. corp. ♂ 0.15—0.27; ♀ cum terebrâ 0.19—0.30; long. al. 0.16—0.26.

*SYN. Trypeta sparsa* WIEDEMANN, Auss. Zweif. II, p. 492.

*Trypeta caliptera* SAY, Journ. Acad. Phil. VI, p. 187, 3.

*Platystoma latipennis* MACQUART, Dipt. Exot. II, 3, p. 200. Tab. XXVI, f. 8.

*Acinia novæboracensis* FRICH, First Report, 67.

*Trypeta sparsa* LOEW, Monographs, etc., I, p. 78. Tab. II, f. 13.

*Hab.* Northern Wisconsin River (Kennicott); Texas (Bel-frage).

*Observation 1.*—*Trypeta sparsa* Wied. is either a very variable species, both in its size and in the shape of its wings, or else several species are mixed up here, which, owing to the insuffi-



ciency of my materials, I am unable to distinguish. The description given in the first volume of these Monographs refers to the specimen from Northern Wisconsin River. Another specimen from the same locality, much smaller and paler and with less broad wings, has been mentioned in a note, appended to the same description. The mention concerning the size of the specimen, however, has been omitted there. The drops on the wings of that specimen are larger and more rounded than in ordinary specimens and show less tendency to form longitudinal rows; the costal cell also contains such drops, while in the larger specimens it shows at the utmost some pale drops along the auxiliary vein. Nevertheless, even now, I would not consider this specimen but as a variety of *T. sparsa*.

*Observation 2.*—Wiedemann's collection contains at present, under the name of *T. sparsa*, a pair of specimens, the communication of which I owe to the kindness of the Vienna Museum. In the list of species sent to me, they were marked as coming from Brazil. As Wiedemann prepared his description from a single female of unknown origin, it seems hardly probable that the female specimen now existing in his collection is the typical one. It is more likely, on the contrary, that the couple of specimens from Brazil now to be found in the collection was later added to it by Wiedemann. Both sexes most closely resemble my Wisconsin specimens, except that the wings are still broader, which is caused by the greater breadth of the costal and stigmatical cells; their anterior margin is distinctly more convex. These specimens seem therefore to belong to a South American species, very closely allied to the North American one. However, my conviction that such is the case has been somewhat shaken by a number of specimens from Texas, collected by Mr. Belfrage. The larger ones have the wings a little broader than the larger specimens from Wisconsin, and the pellucid drops are less regularly distributed; the costal and stigmatical cells are not broader; a small and incompletely colored specimen has much narrower wings than the larger specimens; yet they are broader than the wings of the above-mentioned smaller specimen from Wisconsin. Whether the specimens from Wisconsin and Texas belong to the same species, will have to be proved by further observation.

*Observation 3.*—The present species, together with *T. rotundipennis*, as well as the species represented by the above-

mentioned specimens from Brazil, now called *T. sparsa* in Wiedemann's collection, form a separate genus, the characters of which may be easily gathered from the descriptions of *T. sparsa* and *rotundipennis* in the first volume. I call it *Eutreta*, in allusion to the characteristic picture of the wings.

**30. *T. rotundipennis* Lw.** ♂.® (Tab. X, f. 14).—Fusca, alis latis-simis, rotundatis, nigris, albido-guttatis, in marginibus antico et apicali maculas minutas albidas gerentibus.

Brown, wings very broad, rounded, black, dotted with white; the anterior and apical margins are beset with small whitish spots. Long. corp. 0.28; long. al. 0.26.

SYN. *Trypeta rotundipennis* LOEW, Monographs, etc., I, p. 79. Tab. II, f. 14.

*Hab.* Middle States (Osten-Sacken).

*Observation.*—Since the above-quoted description was drawn, I have not received any addition to the single, imperfect specimen in my collection, and have, therefore, nothing more to add about it. The systematic position of this species has been discussed above, in the third observation to *T. sparsa*.

**31. *T. culta* WIED.** ♂ ♀. (Tab. XI, f. 3).—Ex rufo-lutea; caput nigro-maculatum; alæ luteæ, in margine antico toto, in apice et in marginis postici dimidio apicali eleganter radiatæ, in disco maculis aliquot magnis fusciscentibus, maculâ minutâ atrâ, guttisque aliquot limpidis, fusco-circumscriptis, notatæ, in angulo postico confertius lim-pido-guttatæ, venâ longitudinali tertiâ nudâ.

Reddish-yellow; head with black spots; wings clay-yellow, the anterior margin, the apex, and the apical portion of the posterior margin are handsomely adorned with ray-like streaks; upon the middle there are some brownish spots, a small black dot, and a moderate number of hyaline drops, margined with black; on the posterior angle numerous hyaline drops; the third longitudinal vein not bristly. Long. corp. ♂ 0.21, ♀ cum terebrâ 0.31; long. al. 0.29—0.32.

SYN. *Trypeta culta* WIEDEMANN, Auss. Zweif. II, p. 486, 16.

*Acinia fimbriata* MACQUART, Dipt. Exot. II, 3, p. 228, 5. Tab. XXXI, f. 5.

*Trypeta culta* LOEW, Monogr. etc., I, p. 94. Tab. II, f. 29.

Reddish-yellow, opaque; the head somewhat paler yellow. The front of moderate breadth, dark yellow; the two bristles before the ocelli, directed forwards, and three strong bristles on the lateral margin of the front, are black; the other frontal bristles yellowish. The frontal lunule and the anterior part of

the lateral frontal border are shining; upon the first, almost without exception, a very small, deep black longitudinal dot is perceptible; near the antennæ, at the orbit of the eye, there is a deep black dot and a black spot in the middle of the posterior orbit. The face is deeply excavated, shining and sometimes with a distinct steel-blue reflection; upon its middle, below the antennæ, there is a rounded black spot, on each side an elongated, larger one, descending from the lower angle of the eye to the oral margin; the oral opening is very large, somewhat drawn upwards anteriorly. Palpi yellowish, broad, reaching to the anterior edge of the oral opening, with black pile at the tip, and with yellowish hairs elsewhere. Proboscis brown, sometimes yellowish-brown, rather stout, not geniculate. The thorax unicolorous, yellowish-red or reddish clay-yellow, opaque; the usual bristles, of which there are two pairs on the middle of the dorsum, are black, the short pile is pale yellowish. Scutellum somewhat paler yellow and rather shining, with erect yellowish bristle-like pile upon the middle and with four black bristles; the two apical ones are inserted upon black dots, while round the basis of the two anterior ones only a darker shade of the ground color is perceptible. The abdomen has the same coloring as the thorax and no spots, or only a trace of two longitudinal, contiguous rows of somewhat darker spots; all the pile and bristles upon it are yellowish and only a certain number of the bristles upon the posterior border of the last segment are usually blackish. The flat ovipositor is almost as long as the four posterior abdominal segments taken together, red, blackish towards the tip. Feet, as well as the bristles on the under side of the front femora, yellow; often, however, some of the bristles are black; the front femora have, a short distance before their end, on the outer side, a small black dot; the posterior femora, on the under side, have two black dots, the one before the middle, the other before the tip. The wings are rather long; their yellowish-red, almost gamboge-yellow color ends in rays along the anterior margin, the apex and the posterior portion of the hind margin; these rays are separated by hyaline intervals; between the humeral crossvein and the end of the auxiliary vein there are three narrow rays, running perpendicularly from the auxiliary vein to the costa, the first of which is less dark than the others; moreover, the extreme root and the extreme tip of that cell are marked by a blackish-brown

crossline; the short stigmatal cell, which is somewhat yellowish, is divided in two halves by a narrow dark brown line and is marked at both ends by a ray; in the marginal cell, besides a ray at the end of the first longitudinal vein, which is incompletely formed and margined with brown on its outer side only, there are three yellow rays, margined with brown and running towards the anterior margin; the first two are attenuated towards the margin and much narrower, the third is much broader; the five following rays are again so narrow, that only the first among them preserves a trace of the yellow coloring of its inner side; they gradually grow longer and end: the first at the tip of the second longitudinal vein, the next two between this and the third vein, the fourth exactly upon the tip of the third, the last a little before the tip of the fourth vein; the hyaline intervals between the last of these rays show upon their middle a faded cloud. The rays upon the latter portion of the posterior margin gradually grow shorter, are rather broad and altogether brown, but not as dark as the narrow rays of the anterior margin or the dark borders of the broader rays which follow upon the latter; they are five in number, or six if the last of them, which is very short, is counted for one; the second and third are less completely separated from each other than the rest, and the fifth, which includes the tip of the fifth vein, is the broadest of all. Upon the middle of the wing the following hyaline drops are visible: 1. Between the second and third longitudinal veins a very small one (sometimes a second one beyond it) below the end of the auxiliary vein and a second, somewhat larger one below the second ray, which runs, in the marginal cell, towards the anterior margin; 2. Between the third and fourth veins, nearer to the latter, there are three drops in a row; the middle one is nearly opposite the middle of the discal cell, the first one beyond the anterior end of this cell, and the last one at an equal distance before its posterior end; 3. In the second posterior cell only a single drop almost in its inner corner; 4. In the discal cell four or five, two of which upon its longitudinal axis (one near the anterior, the other near the posterior end) and three inconstant ones on the posterior margin of the cell (the first sometimes wanting, the second being the largest); sometimes a very small drop in the posterior corner of the discal cell is added to them. All these drops are encircled with dark brown or almost black, in such a manner, that this

dark ring becomes paler round those drops which are more distant from the anterior margin. The convex spot in the first posterior cell is rather large; it contains a comparatively small rounded-ovate deep black dot. Moreover, in the submarginal cell, in the first and second posterior cells, and in the discal cell, differently colored spots (one in each) may be noticed, which, at an oblique view, assume a dark coloring. In the third posterior cell, in the posterior angle of the wing, and on the alula, there is a number of hyaline drops, among which only those placed immediately behind the fifth vein show a trace of a brown border. The double costal spine is strong and comparatively long, the small crossvein is placed upon the last third of the discal cell; the posterior crossvein is steep, but distinctly sinuate; the third longitudinal vein is not bristly.

*Hab.* Savannah (Wiedemann); Carolina (Macquart); Texas (Belfrage).

*Observation.*—*T. culta* is closely allied to the European *T. pupillata* Fall. and *strigilata* Lw., and this relationship is sufficient to justify its location in the genus *Carpotricha*, formed by me for the reception of these species, as well as of *T. guttularis* Meig. However, in consequence of this addition, the definition of the genus, as given by me in the Monograph of the European Trypetæ, will have to be somewhat modified. In *T. culta* the scutellum is less convex, and, although smooth, it is not polished; the tip of the abdomen is not shining. The nature of the pile and the pattern of the picture of the wings, the structure of the head, and the arrangement of the frontal bristles furnish sufficient data for the modification alluded to.

**32. *T. solidaginis* FRCZ.** ♂ ♀. (Tab. X, f. 16.)—Sordide ferruginea, capite pedibusque luteis; frons latissima; scutelli valde convexi setæ duæ; alæ fusco-reticulatæ, apice incisurisq̃ue tribus, unâ marginis antici duabusque postici, hyalinis et parce fusco-maculatis.

Of a dingy ferruginous-red; head and feet clay-yellowish; front exceedingly broad; scutellum very convex, with two bristles; wings reticulate with brown; the tip and three indentations, one on the anterior and two on the posterior margin, hyaline, sparsely dotted with brown. Long. corp. ♂ 0.24—0.25, ♀ cum terebrâ 0.26—0.28; long. al. 0.25—0.26.

SYN. *Tephritis asteris* HARRIS, Ins. Injur. to Veg., 3d Edit., p. 620.

*Acinia solidaginis* FITCH, First Report, 66.

*Trypeta solidaginis* LOEW, Monographs, etc., I, p. 82. Tab. II, f. 16.

*Hab.* New York (Fitch); Washington (Osten-Sacken); New England (Harris). [Canada.—O. S.]

*Observation 1.*—To the description of this species in the *Monographs*, Vol. I, I may add, by way of correction, that the costal spine of the wings is not altogether wanting, but that it is very short and weak, and hence, in some specimens, hardly visible. The words "the first longitudinal vein alone being hairy," in the observation to the above description, only meant that the bristles upon that vein were more like hairs, and not that this vein alone is provided with bristles; the third vein also, bears weak, hair-like bristles.

*Observation 2.*—Baron Osten-Sacken, having seen the original specimen of *Tephritis asteris* Harris in Mr. Harris's collection in the museum of natural history in Boston, has settled its identity with *Acinia solidaginis* Fitch. Harris's name, although based upon an error in the name of the plant upon which this fly undergoes its transformations, would have to be retained, but for the circumstance that Mr. Haliday had previously used it for another European *Trypeta*.

*Observation 3*—Among the genera established for the European *Trypetina*, *Oxyphora* is the only one in which *T. solidaginis* might, perhaps, be placed. Among the European species *Oxyphora Schæfferi* Frnf. is nearest to it in its general appearance; the outline of the wings reminds somewhat of *O. Westermanni*. The much heavier body, the strikingly broad front, and the much broader cheeks, as well as the peculiar shape of the wings, which are broadly rounded at the tip, the heavy, conical, not at all flattened ovipositor of the female, isolate this species sufficiently to justify the formation of a new genus, for which I propose the name of *Eurosta*.

**33. *T. comma* WIED. ♀.** (Tab. XI, f. 2.)—Sordide rufa aut fusca, capite magno, thoracis dorso, tibiis, tarsisque lutescentibus; alæ obtusæ, ex fusco nigræ, guttulis minutis modice dilatioribus adpersæ, maculâ costali trigonâ comma fuscum includente, limbo apicis angustissimo, guttulisque aliquot confertioribus prope venâ longitudinalem sextâ apicem, hyalinis; venâ longitudinalem tertiâ setosâ; scutellum setis duabus instructum; terebra conica, non depressa.

Dingy red or brown, head large, thoracic dorsum, tibiae, and tarsi clay-yellowish; wings obtuse, brownish-black, covered with small, moderately limpid drops; a triangular indentation on the costa contains a brown comma; a narrow border along the apex and a dense cluster of drops near the tip of the sixth vein, are hyaline; the third longitudinal vein is bristly; scutellum with two bristles; ovipositor conical, not flattened. Long. corp. ♀ cum terebrā 0.32—0.34; long. al. 0.30—0.31.

SYN. *Trypeta comma* WIEDEMANN, Anss. Zweif. II, p. 478, 4.

*Acinia comma* MACQUART, Dipt. Exot. II, 3, p. 229, 6.

*Trypeta comma* LOEW, Monographs, etc., I, p. 93. Tab. II, f. 28.

This conspicuous species was described by Wiedemann from a very pale-colored specimen, which I have had occasion to examine. The coloring varies from a dingy brick-red almost to dark brown; the abdomen especially is often dark. The large head is yellow; the front is more than half as broad as the head, usually of a darker yellow; the usual bristles upon it are brown or brownish, weak, and rather short. Antennæ clay-yellow, very short, not even reaching to the middle of the face. Face perpendicular, very little excavated; oral opening of a very moderate size, and the anterior edge of the mouth not projecting; ocular orbits very broad. Eyes elongated, but the cheeks of a considerable breadth, although by far not equalling those of the preceding species; the pile upon them is brownish or brown, sometimes paler; proboscis short, not geniculate; the clay-yellowish palpi broad, reaching to the anterior edge of the oral opening. The upper side of the thorax covered with a thick clay-yellowish pollen and with short, dense clay-yellowish pile; the latter sometimes has a more ferruginous tinge; the usual bristles of the thoracic dorsum are brown and weak; upon its middle there are only two pairs, the anterior one very much behind the transverse suture; it is weaker and shorter than the posterior one. Scutellum dark brown, very convex, with only two bristles. Metathorax and pleuræ are sometimes brick-red, sometimes brown or blackish-brown; the darker the pleuræ are, the darker the bristles upon them. Abdomen unicolorous, brick-red, brown, or brownish-black, with rather delicate blackish or black pile. Ovipositor not compressed, conical, about as long as the last two abdominal segments taken together, with delicate black pile; in paler specimens the ovipositor is red, the extreme tip only black; in very dark specimens it is black with a reddish crossband upon the middle. Very dark specimens have blackish-brown femora; their

tip and the tibiæ are yellowish-brown, the tarsi dirty yellowish; in paler specimens tibiæ and femora are not much darker than the tarsi; front femora with black bristles; tarsi, especially their first joint, somewhat longer than usual, especially in *T. solidaginis*. Knob of the halteres blackish or black. The wings broad and very obtuse at the end, blackish-brown or black, including the extreme root; upon their whole surface are a very variable number of very small dots of but moderate transparency; upon the anterior margin, immediately beyond the stigma, there is a triangular hyaline spot, the tip of which does not quite reach the third longitudinal vein and which includes a blackish-brown crossline, extending from the costa to the second longitudinal vein; the end of the sixth vein is surrounded by a cluster of small, more or less coalescent drops, which extends especially on the anterior side of this vein; the extreme tip of the wing has a very narrow hyaline border, which begins a little before the tip of the third longitudinal vein and ends beyond the tip of the fourth vein; at the tip of these veins the border is very often interrupted; on the posterior margin of the wing there are often two, sometimes three or four, in such a case larger, hyaline drops. The third longitudinal vein is beset with scattered but distinct bristles; at its end, it is strongly bent backwards so that its divergency from the second vein is unusually large; the latter ends rather far from the apex of the wing; the crossveins are but little approximated, the small one is oblique, the posterior one arcuated.

*Hab.* Kentucky (Wiedemann); Maryland (Osten-Sacken).

*Observation 1.*—This species is subject to remarkable variations in the coloring of the body, as well as in the shape of the wings; the tip of the latter is sometimes more, sometimes less distinctly obtuse; all these differences certainly do not constitute specific distinctions. The figure which I have given in the first volume of these Monographs was prepared from a specimen in the Berlin Museum, and as it is based upon a rather hasty pencil sketch, made many years previously, it lays no claim upon an absolute fidelity. This figure shows some discrepancies however, which raise a suspicion that this Berlin specimen is not *Trypeta comma* at all, but a closely allied species.

*Observation 2.*—*Trypeta comma* differs from *T. solidaginis* in its larger eyes, a less excavated face, and a smaller and much



narrower oral opening; the shape of the body, the striking breadth of the forehead, the distribution of the bristles upon it and upon the thoracic dorsum and scutellum, the shape of the ovipositor, the outline of the wings, and the pattern of the picture are remarkably analogous in both species, so as to preclude a generic separation.

**34. *T. latifrons* Lw.** ♀. (Tab. X, f. 22.)—Obscura, capite, tibiis tarsisque lutescentibus, fronte latissimâ, scutello convexo, setis duabus instructo, alæ latiusculæ, colore fusco-nigro pictæ, in disco parcius et subæqualiter reticulatæ, in dimidii apicalis margine radiatæ.

Coloring dark; head, tibiæ, and tarsi clay-yellowish, front unusually large; the convex scutellum with two bristles only; wings rather broad, with a brownish-black picture, upon their middle somewhat sparsely and not very evenly marked with hyaline drops, their apical border radiate. Long. corp. ♀ cum terebrâ 0.30; long. al. 0.27.

**SYN.** *Trypeta latifrons* Loew, Monographs, etc., I, p. 89, 22. Tab. II, f. 22.

**Hab.** Carolina (Zimmerman); Connecticut (Norton).

**Observation.**—A female from Connecticut, communicated to me by Baron Osten-Sacken, is not much better preserved than the female from South Carolina, from which my description in the Monogr. Vol. I was drawn, and for this reason I am not able to give a better one here. Of the two pairs of bristles upon the thoracic dorsum the anterior one has dropped off; it seems to have been inserted rather far behind the transverse suture. The structure of thorax and abdomen, the broad front, the bi-setose scutellum, and the conical, not at all flattened, ovipositor, indicate a relationship between this species and the two preceding ones, from which, however, it differs in the shape of the wings and the pattern of the picture. In the latter two points it reminds one of *Trypeta platyptera* Lw., which differs again in the more narrow front, a four-bristled scutellum, and a flattened ovipositor. Such being the case, we will be better justified in connecting this species with *T. solidaginis* and *comma*, than with *T. platyptera* and its congeners.

**35. *T. melanura* n. sp.** ♀. (Tab. XI, f. 6.)—Lutea, metanoto, abdominis maculis in series quatuor dispositis et terebrâ brevi, atris; caput lætius luteum, fronte latissimâ, facie modice recedente, antennis longis et acutis; femora anteriora macula minutâ nigrâ notatæ; alarum pictura fusca, guttis majusculis hyalinis reticulatâ, quarum in cellulâ posteriore secundâ tres, in tertîâ quatuor conglobatæ.

Clay-yellow; the metanotum, four rows of abdominal spots, and the short ovipositor, deep black; head of a brighter clay-yellow; front very broad, face moderately receding; antennæ long and acute; the anterior femora with a little black spot; picture of the wings brown, reticulate with rather large hyaline drops, among which three form a cluster in the second posterior cell and four in the third. Long. corp. ♀ cum terebrâ 0.13—0.14; long. al. 0.14.

Head almost ochreous-yellow, the rather level face, somewhat retreating on the under side, the moderately broad cheeks, and the lower portion of the occiput pale yellowish. Front more than half as broad as the whole head. Frontal lunule very flat. Third antennal joint unusually long, with a remarkably sharp anterior corner; the thin, bare arista is incrassated at its basis for a short distance only. Oral opening rather large, rounded, but somewhat broader than long; its anterior edge is neither drawn upwards, nor projecting in the profile. Proboscis and palpi yellowish, withdrawn in the oral opening. The pile on the head is ochreous-yellow; the ordinary frontal bristles are brownish or brown. The ground color of the thoracic dorsum is blackish, with the exception of the pale yellow humeral callus, but very much concealed under ochre-yellow pollen, and reddish ochre-yellow, coarse, and almost stubble-shaped pile. When the thorax is viewed from behind, several opaque black, punctiform dots become apparent, especially two on the transverse suture and two larger ones between the first and the posterior border. The bristles of the thoracic dorsum are partly pale yellow, partly brown; viewed against the light, they appear dark. The scutellum, which, in the described specimen, is much damaged, seems very convex; it is smooth and for the most part yellow; among its four bristles, the two apical ones are inserted on small black dots. The abdomen is reddish-yellow or almost honey-yellow and somewhat shining; upon the second segment there are four black dots in a row, the lateral ones of which are small; upon each succeeding segment the lateral spots become larger, and upon the fifth segment the lateral spots completely coalesce with the middle ones, only a median reddish line being left on the segment. The flat, shining black ovipositor is hardly longer than the last abdominal segment. Feet rather dark ochre-yellow; the front and intermediate femora have, upon their hind side, beyond the middle, a little black spot. The reticulate picture of the wings is brown, black-

ish-brown within the stigma; the hyaline drops, appearing in a different light whitish, and which perforate the brown coloring, are generally large, but not numerous; the stigma contains but a single yellowish drop; its extreme basis also has a narrow hyaline border; the triangular cluster of larger drops which occurs on the anterior margin, immediately beyond the stigma, consists here of five drops, absolutely separated from each other; the end of the marginal cell contains but a single small drop; a larger drop occurs below the end of the second longitudinal vein and a similar one under it, in the first posterior cell; between these two drops and the apex of the wing there are four smaller drops, forming a somewhat arcuated crossband; especially characteristic for the species are three conspicuous drops in the second and four similar ones in the third posterior cell, between which the brown coloring is so pale or faded, that they appear almost coalescent; (this is not well expressed in the figure, which is kept altogether in too dark a shade); upon the middle of the discal cell there is a large drop, occupying its whole breadth. The third longitudinal vein is distinctly bristly about as far as the small crossvein; this crossvein corresponds to the last third of the discal cell; the posterior crossvein is straight and very perpendicular.

*Hab.* Distr. Columbia (Osten-Sacken).

*Observation.*—In several respects this species resembles the European species of *Carphotricha*; but, on account of the striking breadth of the forehead, the unusual length of the antennæ, and the comparatively very even face, somewhat retreating below, it cannot well be placed in that genus, especially when *T. culta* Wied. is admitted in it, on account of its rather close relationship to *Carpotricha pupillata* Fall. As I know of no other species with which the present one could be generically united, I prefer to establish a separate genus for it, which I call *Acidogona*.

**36. *T. alba* Lw.** ♂ ♀. (Tab. XI, f. 11.)—Albida, alis concoloribus immaculatis, capite, pleuris, scutello segmentorumque abdominalium singulorum margine postico pallide sulphureis, antennis, terebrâ, pedibusque luteis.

Whitish, with whitish, altogether immaculate wings; head, pleuræ, scutellum, and the posterior margin of the single abdominal segments, sulphur-yellow; antennæ, ovipositor, and feet clay-yellow. Long. corp. ♂ 0.13, ♀ cum terebrâ 0.17; long. al. 0.15—0.16.

SYN. *Trypeta alba* Loew, Berl. Entom. Zeitschr. V, p. 345, 72, Ib., Dipt. Amer. Cent. I, p. 39, 72.

*Trypeta alba* Loew, Monographs, etc., I, p. 100, 18.

*Hab.* Pennsylvania (Osten-Sacken).

*Observation 1.*—I have only the following remarks to make concerning this species, described in the above-quoted places and easily recognizable. The antennæ are often not clay-yellow, but more or less bright ochre-yellow, which is especially the case in the best preserved and fully colored specimens; in such specimens the face is pale sulphur-yellow, while, on the contrary, the front, probably in consequence of desiccation, shows, in other specimens, a more dark yellow, often impure, hue.

*Observation 2.*—This and the next following species show a striking agreement in all plastic characters, especially in the structure of the head, and the characteristic outline of the wings, so that they may be considered as the types of a new genus, distinguished from the related ones by the above-mentioned characters, and which may be called *Aspilota*.

**37. *T. albidipennis* Lw.** ♂ ♀. (Tab. XI, f. 10.)—Nigro-cinerea, thoracis dorso albicante, capite, thoracis vittâ laterali scutelloque sulphureis, alarum albidarum stigmatibus fusco, terebrâ fœminæ atrâ.

Blackish-gray, thoracic dorsum whitish; head, a stripe on the lateral margin of the thorax, and the scutellum sulphur-yellow; wings whitish with a brown stigma; the ovipositor of the female black. Long. corp. ♂ 0.17, ♀ cum terebrâ 0.20; long. al. 0.18—0.19.

SYN. *Trypeta albidipennis* Loew, Berl. Entom. Zeitschr. V, p. 345, 73, and Dipt. Amer. Cent. I, p. 39, 73.

*Trypeta albidipennis* Loew, Monographs, etc., I, p. 100, 19

*Hab.* Pennsylvania (Osten-Sacken).

*Observation.*—The antennæ are usually more ochre-yellow than ferruginous-yellow. The generic location of this species has been mentioned in the note to the preceding one.

**38. *T. Vernoniæ* Lw.** ♂ ♀. (Tab. XI, f. 8.)—Dilute lutea, capite, thoracis vittâ marginali in pleuras dilatatâ, scutelloque purius flavis, thoracis dorso subhelvo, metanoto nigro; alarum dimidium basale impictum, apicale colore subfusco grosse reticulatum, guttis magnis confluentibus, ita ut fasciæ tres valde inæquales fuscæ conspiciantur; primâ incompletâ et obsoletiore, secundâ integrâ, tertiâ postice abbreviatâ.

Pale clay-yellowish; head, a lateral thoracic stripe, dilated upon the pleuræ, and the scutellum of a purer yellow, thoracic dorsum more isabelle-yellow, metanotum black; the basal half of the wings is imma-

culate, the apical half shows a very coarse brownish reticulation, the large hyaline drops of which coalesce in such a manner, that three brown, irregular crossbands are formed; the first is only incompletely developed and rather faded, the second complete, the third abbreviated posteriorly. Long. corp. ♂ 0.18, ♀ cum terebrā 0.22; long. al. 0.17—0.18.

SYN. *Trypeta Vernoniæ* Loew, Berl. Entom. Zeitschr. V, p. 346, 74, and Dipt. Amer. Cent. I, p. 40, 74.

*Trypeta Vernoniæ* Loew, Monographs, etc., I, p. 101, 20.

*Hab.* Pennsylvania (Osten-Sacken); on the iron-weed (*Vernonia*).

*Observation.*—*T. Vernoniæ* agrees in all the plastic characters, especially in the structure of the head and the shape of the wings, with the two preceding species in a very striking manner, and the presence of a picture on the wings alone is not a sufficient ground for a generic separation.

**89. *T. seriata* Lw.** ♂. (Tab. X, f. 18.)—Lutea, alis concoloribus, totis æqualibus et obtusis, per maculas minutas fuscas seriatim dispositas reticulatis, adversus marginem præter trientem basalem nigricantibus, venâ longitudinali tertiâ setosâ.

Clay-yellow; wings of the same color, of a very equal breadth, obtuse at the end, reticulate with small brown spots arranged in rows; blackish along the margin, except on the proximal third of its extent; third longitudinal vein bristly. Long. corp. 0.24; long. al. 0.26—0.27.

SYN. *Trypeta seriata* Loew, Monographs, etc., I, p. 84. Tab. II, f. 18.

*Hab.* Illinois.

*Observation.*—Should *T. seriata* be placed in one of the genera established for the European *Trypetina*, it would of course be the genus *Oxyphora*, the most characteristic marks of which are the reticulate wings and the bristles on the third vein. And, indeed, this species reminds one very much of *Oxyphora Westermanni* Meig. in the very peculiar shape of the wings, and even in the coloring of the body and the pattern of the picture of the wings. But when we bear in mind that this European species occupies in the genus a very isolated, in fact an artificial position,<sup>1</sup> it will appear more natural to withdraw *O. Westermanni* from the genus and to form a new genus of it, together with the above described as well as the next following American species. This genus may be called *Icterica*.

<sup>1</sup> The European *Oxyphora Schafferi* Egger shares this exceptional position, though for other reasons.

**40. *T. circinata* n. sp.** ♂ ♀.—Latea, alis concoloribus, totis aequalibus et obtusis, per circulos fuscios inter se coherentes reticulatis, adversus marginem præter dimidium basale nigricantibus, venâ longitudinali tertiâ setosâ.

Clay-yellow, wings of the same color, of very equal breadth, obtuse at the end, reticulate with small, brown, contiguous circles; infuscated along the margin, except upon its first half; the third longitudinal vein bristly. Long. corp. ♂ 0.24, ♀ cum terebrâ 0.27; long. al. 0.26—0.27.

The resemblance of this species to *T. seriata* is so striking that one would almost be tempted to take it for a mere variety. However, the picture of the wings, perfectly identical in both sexes, shows such differences from that of *T. seriata*, as occur in closely allied species, but not in a variety of the same species. While the reticulation of *T. seriata* consists of small, angular brown spots, arranged in double rows between each pair of longitudinal veins on the middle of the wing, in the present species the spots are replaced by small brown ringlets, mostly closed, but some of them open, and connected with each other. The infuscated portion of the anterior margin in *T. seriata* begins before the end of the auxiliary vein and fills the stigmatal cell entirely, with the exception of a but little perceptible clay-yellow drop at the tip, and a similar, obsolete drop at the basis; between the ends of the first and second longitudinal veins there are, besides the somewhat hyaline spot immediately beyond the former, only two brownish-yellow drops near the anterior margin. In *T. circinata* the extreme tip of the auxiliary vein and the spot on the costa corresponding to it are black, but there is no trace of dark coloring in the costal cell before the tip of the auxiliary vein; the stigma is rather saturate yellow, and has upon its middle a considerable rectangular black spot; the pale spot which follows immediately upon the tip of the first longitudinal vein is more extensive, but less limpid, and the two drops which lie between it and the second longitudinal vein are much larger and more limpid, so that they entirely interrupt the black border along the anterior margin. A similar interruption is caused by a drop immediately beyond the tip of the second longitudinal vein, which is entirely wanting in *Trypeta seriata*. By these complete breaks in the black anterior border *Trypeta circinata* is very easily distinguished from *Trypeta seriata*, which has only one break of this kind immediately beyond the apex of the first longitudinal vein.

*Hab.* New York (Mr. Akhurst).

**41. T. Lichtensteinii** WIED. ♂. (Tab. XI, f. 9.)—Tota lutea; alæ dilute cinereo-hyalinæ, guttis majusculis albicantibus, maculisque tribus fusco-nigris variegatæ, primâ harum reliquis minore et a stigmate oblique decurrente, secundâ quadrangulâ et venam transversam posteriorem includente, tertiâ denique primis duabus majore et apicem alæ cingente.

Altogether clay-yellow; wings grayish-hyaline, with rather large whitish drops and three brownish-black spots, the first among which is smaller than the others and descends from the stigma in an oblique direction, the second is square and includes the posterior crossvein, and the third is larger than the two preceding ones and forms a border along the apex. Long. corp. 0.22; long. al. 0.23.

SYN. *Trypeta Lichtensteinii* WIEDEMANN, Auss. Zweifl. II, p. 497, 31.

*Trypeta Lichtensteinii* LOEW, Monographs, etc., I, p. 92. Tab. II, f. 25.

Clay-yellow, the pile on head, thorax, and feet yellowish; the bristles yellow or yellowish-brown, according to the light in which they are seen; the pile on the abdomen yellowish at the basis only, black elsewhere. Front of a more vivid yellow, rather broad, with long bristles, the eyes rather large, oval; cheeks of a medium breadth. The face rather retreating, somewhat excavated under the antennæ; the anterior edge of the mouth not projecting in the profile. Antennæ yellow, of medium length; the third joint with a rounded anterior corner; the rather long arista is much incrassated at its extreme basis, otherwise very thin and bare. Oral opening rather large, rounded; palpi and proboscis not projecting beyond it; the latter not geniculated. The middle of the upper side of the thorax seems to have borne only two pairs of bristles. The very moderately convex scutellum bears four bristles. Scutellum and abdomen are more shining than the thoracic dorsum, which is opaque in consequence of a yellowish pollen; abdomen without any picture. Wings rather long and of nearly equal breadth; the third longitudinal vein distinctly bristly for a considerable portion of its length; crossveins straight and steep; small crossvein a little beyond the middle of the discal cell. The picture of the wings is a very peculiar one; its principal feature consists of three very conspicuous brownish-black spots; the smallest among them has the shape of an oblique, somewhat irregular half-crossband; with its anterior end it covers the tip of the stigma, with its posterior end it covers the small crossvein and suddenly stops near the fourth vein; the second spot, which covers the posterior crossvein, has a square shape, is

higher than broad and reaches from the fourth vein to the posterior margin; the third spot forms a broad margin of the tip of the wing, which begins not far beyond the first longitudinal vein and, gradually increasing in breadth, reaches beyond the beginning of the second posterior cell. The outlines of these three spots are irregular and sinuate. The remaining surface of the wings is grayish-hyaline; held against the light this grayish surface shows some round, whitish spots of a rather considerable size, occurring especially within the sinuosities along the margins of the dark spots, however, without following their outline exactly. In some places the grayish tinge of the wings becomes infuscated, thus forming several other, probably very variable, spots; the typical specimen shows the following ones: a narrow little spot in the middle of the anterior margin of the costal cell; a hook-shaped spot, which begins at the anterior end of the third brown spot and runs to the second vein; a small, thimble-shaped spot, situated on the fourth vein, a little beyond the posterior crossvein and directed forwards; a little spot upon the posterior margin, in the middle between the second and third of the large brown spots; a punctiform dot upon the middle of the discal cell; a larger spot, behind the preceding one, within the third posterior cell; finally, behind the latter, upon the posterior margin, another small, faded, little spot. It is probable that, sometimes, the greatest part of the grayish surface becomes brownish, and then it may happen that, in some specimens, beyond the root of the wing, but little pale colored portions remain, except the large drops with a whitish reflection. The fact that the described specimen does not seem to be a fully matured one, serves to confirm this supposition.

*Hab.* Mexico (Wiedemann).

*Observation 1.*—Description and figure are prepared after the same specimen in the Berlin Museum, which Wiedemann had before him in drawing his description. In the figure, the engraver has represented the large whitish drops somewhat more vividly than they appear in nature. The relationship of *T. Lichtensteinii* to the two preceding species, is close enough to enable us to place it in the genus *Ictericæ*.

*Observation 2.*—Among the species described in the sequel, *Trypeta æqualis* (Tab. X, f. 20) stands next to the species of *Ictericæ* in the shape of the wings. But, besides the fact that



its wings are neither as equally broad, nor as obtuse, as those of the species united in the genus *Icterica*, that species differs also in the absence of bristles upon the third vein.

**42. *T. humilis* Lw.** ♂ ♀. (Tab. X, f. 17.)—Luteo-cinerea, capite pedibusque saturate flavis, femoribus tamen nigris adversus apicem in mare late, in fœminâ latissime flavis; peristomium valde productum, proboscis geniculata, alæ rare reticulatæ, stigmate atro, non guttato.

Yellowish-gray; head and feet saturate yellow; the femora black, a considerable portion at their tip in the male, a still more considerable one in the female, yellow; edge of the mouth very much produced, proboscis geniculated, wings sparsely reticulate, the black stigma without pale drops. Long. corp. ♂ 0.09—0.1, ♀ cum terebrâ 0.11—0.12; long. al. 0.11—0.12.

Stx. *Acinia picciola* Bigot, R. de la Sagra, Hist. Fis. Vol. VII. Tab. XX, f. 10.

*Trypeta humilis* Loew, Monogr. etc. I, p. 81. Tab. II, f. 17.

*Hab.* Cuba (Poey, Gundlach). [Key West; communicated by Mr. Burgess. O. S.]

*Observation 1.*—The saturate yellow coloring of the apex of the femora in the male has a rather considerable, but at the same time variable, extent; in the female, the yellow sometimes occupies so much space, that the blackish color remains visible at the basis of the femora only. Females with the femora as pale as that, mentioned by me in the first part of these Monographs, seem to be rare, as among the numerous specimens of my collection that single one only is to be found.

*Observation 2.*—To recognize the present species in the *Acinia picciola* Bigot is not possible. Nevertheless the synonymy is not doubtful, as, through the kindness of Mr. Gundlach, I have been put in possession of numerous typical specimens. It is to be regretted that Mr. Bigot has given the species a name which cannot possibly be admitted, unless names like *littella*, *petitella*, *kleinella* for any small species were likewise tolerated.

*Observation 3.*—The strongly produced oral edge and the strikingly geniculated proboscis, with its very much prolonged flaps, reaching backwards as far as the mentum, define this species as an *Ensina*. As soon as exotic species are taken in consideration, this genus cannot be maintained within exactly the same limits which I defined for it in my Monograph of the European species. A part of the species, which I placed there under

the head of *Oxyra*, as for instance *Oxyra elongatula* Lw., and its congeners, will have to be admitted in the genus *Ensina*.

*Observation 4.*—A Brazilian species, not rare in collections, likewise belonging to *Ensina*, is so very like *humilis*, that I give here its description, in order to avoid a possible confusion.

**T. peregrina** n. sp. ♂ ♀. (Tab. X, f. 30.)—Luteo-cinerea, abdomine nigro-maculato, genis angustissimis, peristomio eximie producto, proboscidis geniculatæ labellis longissimis, alis elongatis et subæqualiter fusco-reticulatis; pedes lutei, basali femorum posticorum dimidio piceo; terebra fœminæ atra, tribus ultimis abdominis segmentis simul sumtis longiore.

Yellowish-gray, abdomen spotted with black; the cheeks very narrow, the oral edge very much produced, the flaps of the geniculated proboscis very much prolonged; wings comparatively long and rather uniformly reticulated with brown; feet of a saturate yellow, basal half of the hind femora black; ovipositor of the female black, larger than the last three abdominal segments taken together. Long. corp. ♂ 0.12—0.13; ♀ cum terebrâ 0.14—0.16; long. al. 0.13—0.14.

Resembles *T. sororcula* Wied. from Teneriffe and the European *T. elongatula* Lw. very much, both in the structure of the body and in general appearance. In the female sex, it differs from the latter easily by its ovipositor, which is once and a half as long; the male is easily distinguished by several features of the picture of the wings, which in other respects is very much the same: namely, the drop which lies at the tip of the submarginal cell is not present in *T. elongatula*; in the dark coloring at the extreme end of the discal cell there is only a single hyaline drop, while in *T. elongatula* there are several of them, usually three. From *T. humilis* it differs sufficiently in the scutellum, which is tinged with yellow at the tip, in the coloring of the feet and in the picture of the wings. Yellowish-gray; the head, of the same structure as in the species just compared with it, rather saturate yellow, as well as antennæ, palpi, and proboscis; the occiput alone in part gray. Front long and not very broad; along the orbit with a narrow, rather whitish border. Antennæ rather broad, not quite descending to the anterior edge of the mouth, which is somewhat drawn upwards and remarkably projecting in the profile. Eyes rounded; cheeks very narrow. Oral opening very much drawn out; the very elongated flaps of the geniculated proboscis reach backwards to the mentum. The usual bristles of the front, the thorax, and the scutellum are black; the latter is yellow at its tip only. The abdomen is of the same color as the thorax, and bears, like the latter, some short, pale yellowish pile, while the longer hairs on the posterior border of the last segments are black. The flattened and only moderately pointed ovipositor is shining black and a little longer than the last three abdominal segments taken together; its short pubescence is almost without exception black.

Feet dark yellow, only the hind femora are brownish-black beyond their middle, and the other femora somewhat infuscated near the root and with a brown stripe on the under side. The wings are elongated, hyaline, with a grayish-brown, very loose, but not disconnected, reticulation; the root of the wings is not spotted up to the end of the small basal cells; beyond this, up to the stigma, there are only three inconspicuous grayish spots. The grayish-brown stigma contains a rather conspicuous hyaline drop (represented too small on the figure); a spot adjoining it, comparatively small and not much perforated, reaches beyond the second vein with two points only, and contains a little drop immediately before the second vein. The larger and less perforated spot before the end of the second longitudinal vein always contains a considerable hyaline drop near the anterior margin; between the second and third longitudinal veins, the same spot contains two or three small drops and is variously connected with the remaining reticulation. Between these two less perforated spots, there are, in the marginal cell two, in the submarginal three, large hyaline drops, which generally assume the shape of quadrangular spots, and are only separated by grayish-brown lines, running from one longitudinal vein to the other. Upon the remainder of the surface of the wing, the reticulation is formed by rather considerable rounded drops, and is more regular; only in the proximity of the posterior crossvein there are no drops.

*Hab. Brasil.*

**43. *T. angustipennis* Lw.** ♂ ♀.—*Cinerea, capite pedibusque flavis, femoribus magnâ et parte nigris vel fuscis; proboscis non geniculatâ; alæ subangustatæ, nigro-reticulatæ, in basi et limbo marginis postici subimmaculatæ, stigmatæ non guttato, maculis duabus ordinariis obscurioribus mediocribus, separatis, secundâ guttulam unicam, rarius duas includente; terebra fœminæ atra, duobus ultimis abdominis segmentis simul sumtis subæqualis.*

Gray; head and feet yellow; femora for the most part black or brown; proboscis not geniculated; wings reticulate with black, almost without spots at the basis and in the vicinity of the posterior margin; the two ordinary dark spots only of middle size and separated from each other; in the second, one, rarely two, hyaline drops; ovipositor black, almost as long as the last two abdominal segments taken together. Long. corp. ♂ 0.13, ♀ 0.14—0.15; long. al. 0.14.

*SYN. Tephritis Leontodontis ZETTERSTEDT, Ins. Lapp. 745, 6. Var. a. (ex p.).*

*Trypeta angustipennis* LOEW, Germ. Zeitschr. V, p. 362. Tab. II, f. 4.

*Tephritis angustipennis* ZETTERSTEDT, Dipt. Scand. VI, p. 2229, 35.

*Tephritis angustipennis* LOEW, Trypetidæ, p. 113, No. 24.

*Tephritis segregata* FRAUENFELD, Verh. Zool. Bot. Ges. XIV, p. 147.

Gray; thorax without picture; the pile upon it is whitish; the bristles black. Abdomen blackish-gray, without spots; the pile

whitish, only the bristles upon the posterior margin of the last segment are black. Ovipositor black, hardly as long as the last two segments taken together; with distinct whitish pile upon its anterior half. Feet yellow; the femora for the most part black or brown. The wings are comparatively a little longer and narrower than in most of the related species. The rather dark reticulation is loosely meshy and somewhat disconnected; it disappears almost entirely in the region of the posterior margin, with the exception of a few little spots, which distinguishes this species from the otherwise related ones; the black stigma does not include a hyaline dot; the two ordinary dark spots are of moderate size; the first is connected with the stigma and reaches from it directly backwards; the second usually contains, near the anterior margin, only a single hyaline drop, which lies immediately beyond the tip of the second longitudinal vein; this spot reaches as far as the fourth longitudinal vein; the two rays which, in the related species, run from this vein over the second posterior cell to the posterior margin, are incomplete or wanting; the posterior crossvein also has only a comparatively narrow dark border, which sometimes exists on its posterior half only; upon the posterior part of the crossvein, this border emits a short branch, characteristic for this species, and reaching into the discal cell; this branch sometimes coalesces with a second similar branch upon the posterior side of the fourth vein, so as to include a hyaline drop; otherwise the picture of the discal cell is limited to a small crossband, lying beyond its middle, or there is sometimes before it, near the anterior margin of the cell, another dark spot, which in some specimens becomes a second small crossband; upon the posterior side of the fifth vein generally two small, dark spots of variable size are observable, of which the one nearer the root of the wing is often wanting.

*Hab.* Yukon River (Kennicott).

*Observation 1.*—I cannot distinguish this species from the *T. angustipennis* occurring in Scandinavia; the typical pair after which I have described it in *Germar's Zeitschrift* has, it is true, the femora much less dark, but as the specimens seem to be immature, I do not consider this a specific difference. The figure given in *Germar's Zeitschrift* has not well succeeded in the engraving and gives only an approximate idea of the picture of the wings.

*Observation 2.*—Should we distribute the present and all the next following species among the subgenera which I have established for the European *Trypetidæ*, they would have to be referred to the genera *Oxyphora*, *Oxyna*, *Tephritis*, and *Urellia*. The genus *Urellia* is easily distinguished from the others by the picture of the wings: it consists in a conspicuous star-shaped black design near the apex, while the rest of the wing is altogether immaculate, or is marked with only a few isolated spots, at the utmost with a very pale reticulate picture. A part of the species described in the sequel, can undoubtedly be referred to *Urellia*. Among the remaining species, those would have to be located in the genus *Oxyphora*, which have the third longitudinal vein of the wings beset with bristles. This character is of a very easy application when a number of well-preserved specimens is at hand, but it becomes of much less value when applied only to single and indifferently preserved specimens. For this reason I am not quite sure whether in all the species in which I have not been able to discern the presence of bristles on the third vein, they are really wanting; and hence, with the materials I now possess, I am not able to refer with certainty to *Oxyphora* the North American species which may belong to it. Among the North American species with a distinctly bristly third longitudinal vein, *T. geminata* alone comes near the European species of *Oxyphora*, while *T. timida* is more related not to the former, but to the European *T. guttata* Fall., and to the American *T. tenuis*, *melanogastra*, and *mexicana*, in which I am unable to discern the bristles upon the third vein. Thus, the maintenance of the genus *Oxyphora* for those species only which have bristles upon the third vein, would separate from each other species most closely allied. In order, therefore, to make this genus applicable to the North American species, we should exclude from it all the species the picture of the wings of which ends in distinctly developed rays, in which case only *T. geminata* would remain in it. Theoretically there is no objection to such an arrangement; practically, however, there remains the difficulty of ascertaining positively the presence of bristles upon the third vein in all the specimens which I have at hand, and this difficulty compels me to drop entirely the genus *Oxyphora* for the present. Should we follow the suggestion already made above, of removing from the genus *Oxyna* those species which have remarkably prolonged

flaps of the proboscis, and placing them in the genus *Ensina*, then the difference between *Oxyna* and *Tephritis* is rendered so very subtle, as to become unavailable for my essay of a classification of North American *Trypetina*, based as it is upon very insufficient materials. The question arises, therefore, whether it would not be better, temporarily, to bring together all the species to be described below (with the exception of the *Urelliæ*) under the head of the genus *Tephritis*, or else to distribute those species in genera on some other principle. The latter course seems to me preferable, in rendering the determination of the species easier. I would propose to call *Tephritis* those species, the picture of the wings of which does not form at the apex distinctly developed rays, and those which have such rays would form a new genus *Euaresta*. Most species will then gain a position in conformity to their true relationship, as well as to their habitual affinities; and although it cannot be denied that the location of some species will thus be rendered somewhat artificial, this disadvantage cannot well be avoided as long as the knowledge of the American fauna is not more complete than it actually is.

That *Trypeta angustipennis* belongs to the genus *Tephritis* results from the foregoing explanation.

*Trypetina*  
**44. T. finalis** Loew. ♂ ♀. (Tab. XI, f. 4.)—Cinerea, capite pedibusque luteis, proboscide non geniculatâ, alis nigro-reticulatis, fasciâ obliquâ inde a stigmate trans venas transversales ad posticum alæ marginem ductâ, maculisque duabus alterâ subapicali, costæ contiguâ et alterâ apicali non reticulatis, stigmati nigri basi dilutissime subflavescente, venâ longitudinall tertiâ nudâ.

Cinereous; head and feet clay-yellow; proboscis not geniculated; reticulation of the wings black; a crossband running from the stigma over the crossveins, a spot near the anterior margin before the apex, and another one on the apex, are not reticulate; the basis of the black stigma is of a very faint yellow; the third longitudinal vein is not bristly. Long. corp. ♂, 0.16; cum terebrâ 0.24; long. al. 0.20—0.21.

SYN. *Trypeta finalis* Loew, Dipt. Am. Cent. II, 78.

Cinereous, thorax and abdomen without any picture. Head, antennæ, and palpi rather dark yellow, the larger part of the occiput dark brown. The front is of a very moderate breadth; its usual bristles are black. The antennæ do not reach to the anterior edge of the mouth; their second joint does not bear a longer bristlet; the anterior corner of the third joint is rounded;

the arista is but little incrassated at the basis, its pubescence is but very little perceptible. The upper side of the thorax bears some short, yellowish-white pile and black bristles, two pairs of which seem to have been inserted upon its middle. Scutellum, at the basis, of the same color with the thorax, towards the tip more or less yellowish; it bears four black bristles. The comparatively somewhat narrow abdomen is likewise of the same color with the thorax, its last segment a little elongated; its short pubescence is yellowish-white; the long bristles at the end of the last segment are usually black. The flat ovipositor of the female is somewhat longer than the last two abdominal segments taken together, red, blackened at the root and at the extreme tip only; its short and fine pile is of a very pale color. The wings are comparatively long and narrow, coarsely reticulate with brownish-black upon their whole surface; the root of the wing, up to a little beyond the end of the small basal cells, shows but some scattered spots; upon the rest of the surface the single drops are large and hence rather close together, although but little coalescent; no drops at all, or almost none, are to be found on a crossband running obliquely from the stigma over both crossveins to the posterior margin of the wing, on a spot beginning at the anterior margin near the apex of the wing, and on a smaller spot upon the apex itself; the basis of the black stigma forms a large, limpid drop, somewhat tinged with yellowish; the usual triangular cluster of drops between the stigma and the unperforated crossband before the apex consists of six drops, three quadrangular ones between the costa and the second longitudinal vein, a larger quadrangular spot and a smaller rounded one between the second and third longitudinal veins, finally a large round one beyond the third vein. The latter vein has no bristles; the small crossvein corresponds to the last third of the discal cell.

*Hab.* California (A. Agassiz); Texas (Belfrage).

*Observation.*—This species is a normal *Tephritis*.

**45. *T. clathrata* Lw.** ♀. (Tab. X, f. 15.)—Cana, capite pedibusque flavis, femoribus liturâ nigricante signatis, abdomine bifariam nigromaculato; alæ colore nigro rare maculato-reticulatæ, stigmatæ atro guttam hyalinam includente, venâ longitudinali tertiâ nudâ; peristomium modice productum et proboscis breviter geniculata; terebrâ aterima, duobus ultimis abdominis segmentis simul sumtis æqualis.

Whitish-gray, head and feet yellow, femora with a black streak, abdomen with two rows of black dots, wings with a sparse reticulation, almost reduced to spots; the stigma includes a hyaline drop; third longitudinal vein not bristly; oral edge moderately produced, proboscis short, geniculate; the deep black ovipositor is as long as the last two abdominal segments taken together. Long. corp. 0.12; long. al. 0.13.

SYN. *Trypeta clathrata* Loew, Monographs, etc., I, p. 80. Tab. II, f. 15.

*Hab.* Middle States (Osten-Sacken).

*Observation.*—In accordance with what has been said in the second observation to *T. angustipennis*, *T. clathrata* belongs to the genus *Tephritis*. Should the distribution adopted by me in my Monograph of the European *Trypetidæ* be strictly applied to this species, it would, on account of the distinctly geniculate proboscis with but moderately prolonged flaps, be referred to the genus *Oxyna*; and it agrees very well with a number of European species, placed in that genus.

**46. *T. geminata* Lw. ♀.** (Tab. XI, f. 1.)—Ex luteo-cinerea, capite, thoracis margine laterali, scutello, abdominis dimidio basali, femorum apice, tibiis tarsisque flavis, pleuris, metanoto, abdominis maculis et apice, terebrâ femoribusque ex nigro fuscis; alæ præter basim fusce, limbo-guttatæ, guttulis disci minutis et raris, guttis marginis postioribus majoribus, anguli axillaris confertioribus, maculis denique duabus costalibus trigonis limpidis, venâ longitudinali tertiâ setosâ.

Yellowish-gray; head, lateral margin of the thorax, scutellum, anterior half of the abdomen, tip of the femora, tibiae, and tarsi, yellow; pleurae, metanotum, spots and posterior part of the abdomen, ovipositor, and femora blackish-brown; wings, with the exception of the basis, brown, with pale drops, which are small and scattered in the middle, larger upon the posterior margin, more dense upon the posterior angle; upon the anterior margin there are two triangular hyaline spots; the third longitudinal vein is bristly. Long. corp. 0.17; long. al. 0.20.

SYN. *Trypeta geminata* Loew, Dipt. Am. Sept. Cent. II, 75.

Head pale yellow, only a large spot upon the occiput blackish-brown; front rather broad; the ordinary bristles pale brownish or almost yellowish. Antennæ dark yellow; the short pile upon the second antennal joint pale yellowish; a single more elongate hair is black; the anterior corner of the third joint is rather sharp. Face rather concave and the anterior corner of the mouth rather conspicuously projecting. Cheeks narrow. Oral opening large, rounded; palpi and proboscis short, not reaching beyond



the anterior edge of the oral opening; proboscis not geniculated. The ground color of the upper side of the thorax is black, but, in consequence of its pulverulence and of its short, yellowish pile, it appears gray; upon its anterior margin, in the vicinity of the yellowish humeral callus, there are some blackish hairs; the ordinary bristles, of which I perceive only two pairs upon the middle of the dorsum, are brown. The lateral margin of the thoracic dorsum is yellow; scutellum yellow, with four bristles. Metanotum and pleuræ blackish-brown; the latter rather shining; the bristles upon them for the most part black. The ground color of the abdomen is yellow; it has four rows of brownish-black spots, which begin to expand upon the third segment; upon the fourth and the following segments they coalesce in such a manner that the segments appear altogether blackish-brown. The pile upon the abdomen is generally whitish-yellow, but upon the black spots it is black; the bristles upon the posterior margin of the posterior segments are generally black. The rather broad ovipositor is of a shining blackish-brown, flattened, although somewhat swollen at the basis; its short and very delicate pile is not easily discernible; it seems to be brownish. Femora brownish-black, the anterior ones with long black bristles; the extreme root and the tip dark yellow. Tibiæ and tarsi rather dark yellow; wings of the ordinary shape, blackish-brown, sparsely guttate; the root of the wings, almost as far as the tip of the small basal cells, is rather hyaline and almost altogether immaculate; the alula also, bears no spots and is without dark coloring; the brown coloring begins on the anterior margin about the middle of the costal cell, and includes before its end a rather large hyaline drop, close by the margin; a smaller hyaline drop is placed upon the tip of the brownish-black stigma; immediately beyond the stigma, on the anterior margin, there are two triangular, hyaline spots, separated only by a brown stripe; their end crosses the second longitudinal vein; the whole middle portion of the wing is perforated by a few isolated, very small hyaline drops; upon the second half of the posterior margin there are four large hyaline drops, two before and two after the end of the fifth longitudinal vein; a fifth, much smaller drop, is placed much nearer the tip of the fourth vein; the last portion of the sixth longitudinal vein is surrounded by a cluster of somewhat larger spots, which, in consequence of the more faded brown,

surrounding them, appear more coalescent; in the posterior angle of the wing the pale drops are more numerous and somewhat larger than upon the middle of the wing, and moreover, well separated from each other; the apex of the wing shows between the third and fourth veins a very narrow, hardly apparent hyaline border.

*Hab.* Pennsylvania (collection v. Winthem).

*Observation.*—In accordance with the explanations given in the second observation to *T. angustipennis* I leave *Trypeta geminata*, in spite of its distinctly bristly third vein, in the genus *Tephritis*, but I do this with the explicit understanding that this position is an unnatural one. In the above-quoted place I have already explained why one would feel tempted to place this species in the genus *Oxyphora* on account of the pattern of its picture, as well as of the bristles upon the third vein; but I must again add that this location would not be natural. Its rather stubble-shaped pile, the distribution of the bristles upon the front, and the structure of the antennæ indicate a rather close relationship to those European species which I have united in the genus *Carphotricha*; nevertheless, in some other characters it differs from those species in a measure which prevents its reception in that genus. A number of South American species stand in the same relation to the European *Carphotrichæ*, although they differ among themselves in many very striking plastic characters. A more complete study of these species will result in the breaking up of the genus *Carphotricha*, based upon too insufficient material, and then only, in all probability, *T. geminata* will find its true position.

**47. *T. fucata* FABR.** ♂.—Lutea, capite pedibusque flavis; setæ scutelli quatuor; alæ guttis hyalinis majusculis subraris reticulatæ, retis parte posticâ unicolore ex cinereo-fuscâ, anticâ luteo et fusco variâ, ita ut guttulæ luteæ guttis hyalinis interjectæ sint, margine antico strigulis quinque et maculâ subapicali fuscis notato, venâ longitudinali tertiâ setosâ; proboscis non geniculata.

Clay-yellow, head and feet of a purer yellow; scutellum with four bristles; the reticulation of the wings, formed of rather large and moderately numerous hyaline drops, is uniformly grayish-brown upon the posterior part of the wings, yellow and brown upon the anterior portion, in such a manner that yellowish drops are mixed among the hyaline ones; upon the anterior margin, there are five small brown transverse streaks and

before its end there is a brown spot; the third longitudinal vein is beset with bristles; proboscis not geniculated. Long. corp. 0.17; long. al. 0.20.

*Syn. Musca fucata* FABRICIUS, Ent. Syst. IV, p. 359, 194.

*Tephritis fucata* FABRICIUS, Syst. Antl. p. 321, 24.

*Trypeta fucata* WIEDEMANN, Auss. Zweifl. II, p. 505, 44.

Clay-yellowish, almost ochre-yellow. Head rather pale yellow. Front and sides of the face with short, unusually dense yellowish pile. Front of a medium breadth; the bristles brownish-yellow, brown towards the tip. Antennæ pale yellow, of medium length, reaching almost to the anterior edge of the mouth, which is very much drawn upwards; the short pile on the second joint is yellowish; the third joint has an indistinctly rounded anterior corner; antennal arista apparently bare, but little incrassated at the basis. Face rather narrow, somewhat excavated, distinctly carinate between the antennal foveæ; in the profile, its lower part is produced in the shape of a short snout. Eyes large, oval; cheeks narrow, with yellow pile and bristles. Oral opening large, longer than broad; the rather broad palpi yellowish and with yellowish pile, reaching to the anterior edge of the oral opening; proboscis short, not geniculated. The whole thorax is so thickly covered with yellow pollen and short, yellow pile, that its ground color, which seems to be grayish-brown, is hardly visible; the ordinary bristles, two pairs of which are inserted upon the middle of the upper side, are brownish-yellow; their tip is dark brown. The ground color of the scutellum is pale yellow, which color is, however, but little apparent, on account of a short yellow pile, similar to that on the thorax; the scutellum has four bristles. Abdomen of the same coloring as the thorax; the short hairs and bristles are all yellow. Feet yellow, with yellow pile, the anterior femora have yellowish bristles. The reticulation of the wings consists of hyaline, almost whitish, rather large, and not very numerous drops; it does not reach the extreme root of the wings; upon the posterior margin and at the extreme apex of the wing the coloring is uniformly grayish-brown; elsewhere, it is clay-yellow, with a brown picture, which partly frames in the hyaline drops, partly includes little clay-yellowish drops, so that the coarser reticulation formed by the hyaline drops, in its turn appears reticulate. Upon the anterior margin itself there are five, in part almost punctiform, brownish-black transverse streaks; upon the

end of the marginal cell a brownish-black spot; the streaks are upon the humeral crossvein, in the middle between the latter and the basis of the stigma, upon the latter, on the end of the stigma, and between that and the tip of the second longitudinal vein. The small crossvein lies a little beyond the last third of the discal cell. The third longitudinal vein is distinctly bristly.

*Hab.* The Antilles? (Fabricius); South America (Wiedemann); Buenos Ayres (collect. Wiedemann).

*Observation 1.*—Fabricius, the first describer of the species, names Dr. Pflug as the discoverer, and the South American islands as the *habitat*, which probably means the Antilles. Later, the species was described by Wiedemann, who names South America as the *habitat*. It is impossible to tell from the descriptions of both authors, whether they really meant the same species, although the descriptions contain nothing positively contrary to this assumption. As the species is easy to identify, and as Wiedemann's identification was based upon the comparison of Fabricius's specimens, it can be safely assumed that he has described the same species. My description is based upon a male, marked Buenos Ayres and communicated to me as a type from Wiedemann's collection.

*Observation 2.*—This species may also remain in the genus *Tephritis*, for the sake of facilitating identification, although its third vein is distinctly bristly. This character, as well as the not geniculated proboscis, recalls those species which, in my Monograph of the European Trypetidæ, I placed in the genus *Oxyphora*; in fact I know of no other American species which stands closer than *T. fucata* to the typical species of that genus, as, for instance, to *T. corniculata* Zett., *biflexa* Lw., etc. I also call attention to a peculiarity of most species of this group, that the dark spots of the picture in the female are more extensive than in the male; this may likewise be the case with *T. fucata*.

**48. *T. albiceps* n. sp. ♂ ♀.** (Tab. XI, f. 5.)—Ex luteo cinerea, capite albicante, fronte, antennis, scutello pedibusque luteis, abdomine bifariam nigro maculato; alæ latiusculæ, præter imam basim totæ colore fusco-nigro guttato-reticulatæ, guttis valde inæqualibus, in apice et prope venam transversam posteriorem quam in reliquâ alâ minus confertis, stigmate nigro uniguttato, venâ longitudinali tertiâ non setosâ; terebrâ fœminæ aterrimâ, duobus ultimis abdominis segmentis simul sumtis æqualia.

Yellowish-gray; head whitish; front, antennæ, scutellum, and feet yellow; the abdomen with two longitudinal rows of black spots; wings somewhat broad, and with the exception of the extreme basis, entirely covered with a guttate brownish-black reticulation; the drops are of a very unequal size and less numerous upon the apex and in the vicinity of the posterior crossvein; the black stigma has a hyaline drop; third longitudinal vein not bristly; ovipositor of the female deep black; as long as the last two abdominal segments taken together. Long. corp. ♂ 0.13, ♀ 0.16; long. al. 0.15—0.16.

Yellowish-gray; thorax and abdomen with whitish-yellow pile; the latter with two longitudinal rows of black or blackish dots. In well-preserved specimens the head is white, and it probably has the same color in living ones; in some of the dried specimens it has assumed a yellowish hue; the front, with the exception of its lateral margins, is yellowish; the usual bristles upon it are almost without exception black; the bristles upon the vertical margin are pale yellowish. Antennæ pale yellowish; the third joint has an almost sharp anterior angle. Oral opening large, somewhat longer than broad; the anterior edge of the mouth rather drawn upwards, somewhat projecting in the profile. Palpi pale yellowish. Proboscis yellowish, short geniculate, with but moderately prolonged, comparatively stout flaps. The upper half of the occiput is gray, with the exception of the margin along the orbit. The ground color of the humeral callosities is yellow, while upon the rest of the thorax it is blackish. The bristles of the thoracic dorsum are all black, those of the pleuræ are partly black, partly pale yellowish. Scutellum pale yellow; lateral angles and sometimes also the basis darker; with four black bristles. The bristles upon the posterior margin of the last abdominal segments have the same pale yellowish tinge as the pile upon the abdomen; only exceptionally a dark bristle is sometimes found among them. The ground color of the abdomen is not quite constant; as a rule, it is blackish; I possess specimens, however, in which, upon the posterior margin of the second and third segments, it is yellowish-red. The ovipositor is shining black, rather strongly contracted towards its end, as long as the last two abdominal segments taken together; their short pile is very delicate and hence somewhat difficult to discern; it seems to have the same coloring as the pile on the abdomen. Feet saturate yellow. The wings have an almost regularly elliptical shape and are somewhat broader in the female than in

the male (the figure is made from a male specimen). The guttate reticulation, which leaves open the extreme basis only, has a brownish-black coloring, which assumes a paler hue wherever the drops are nearer together; upon the stigma, however, and upon the end of the marginal cell, it becomes nearly black; the stigma contains a rather conspicuous hyaline drop; the drops upon the remaining surface are in general large, upon the middle of the wing, however, numerous, much smaller drops are interspersed, which perforate the dark coloring between the larger drops; this also takes place between the six large drops which form the usual pyramid of drops, situated beyond the stigma; upon the portion of the wing beyond this pyramid there are generally but very few little drops, and those are usually in the proximity of the pyramid; some larger drops, rather distant from each other, are also to be found there, and among these a row of very rounded drops along the margin of the wing, sometimes a little remote from it; they are either of very unequal size (as in the figure), or of the same size; the proximity of the posterior crossvein shows a more considerable space, which is but little perforated. The third longitudinal vein is not bristly.

*Hab.* Canada (Couper); English River (Kennicott); Maine (Packard).

*Observation.*—In the distribution adopted by me for the American species, the present one would belong to the genus *Tephritis*. Should my distribution of the European *Trypetæ* be applied to it, the shape of its oral opening and of the proboscis would refer it to *Oxyna*.

**49. *T. euryptera* n. sp. ♀.**—Ex luteo-cinerea, abdomine bifariam nigro-maculato, capite et apice scutelli flavicantibus, pedibus luteis; alæ valde dilatatæ, rotundato-ovatæ, præter imam basim totæ colore fusco-nigro guttato-reticulatæ, guttis valde inæqualibus, in apice et prope stigmâ venamque transversam posteriorem minus confertis, stigmate uniguttato, venâ longitudinali teritiâ non setosâ; terebrâ fœminæ aterrinâ, duobus ultimis abdominis segmentis simul sumtis æqualis.

Yellowish-gray; abdomen with two longitudinal rows of black spots; head and tip of the scutellum pale yellow; feet saturate yellow; wings very broad, rounded oval, with the exception of the extreme basis covered with a guttate, brownish-black reticulation, the drops of which are of a very unequal size and less numerous in the vicinity of the stigma, of the posterior crossvein, and on the apex of the wing; stigma with a hyaline drop; the third longitudinal vein not bristly; the ovipositor of the

female deep black, as long as the last two abdominal segments taken together. Long. corp. cum terebrâ 0.16; long. al. 0.16.

Closely allied to *T. albiceps* and very like it, but easily distinguished by its very broad wings. Yellowish-gray; thorax and abdomen with yellowish-red pile; the abdomen with two longitudinal rows of black spots. Head yellowish; front and antennæ more yellow; the usual bristles on the front black, the bristles on the vertical margin bright reddish-yellow. The third antennal joint with an almost sharp anterior corner. The oral opening longer than broad, the upper oral edge somewhat drawn upwards, distinctly projecting in the profile. The rather broad palpi and the proboscis are yellowish; the latter short geniculate, with but moderately prolonged, rather stout flaps; the occiput, in the vicinity of the point of attachment, grayish. The ground color of the humeral callus is yellowish, that of the thorax blackish; the bristles of the dorsum are black, the two pairs upon its middle are inserted upon very small black dots, easily overlooked. Scutellum yellow at the tip, with four black bristles. Ovipositor of the female shining black, about as long as the last two abdominal segments taken together (in the only specimen in my possession the shape of the ovipositor is not distinctly discernible, but it does not seem to differ from that of *T. albiceps*); its short pubescence is delicate, and hence somewhat difficult to perceive; its coloring seems to be altogether reddish. Feet saturate yellow. The wings are very broad and have a rounded elliptical shape. The guttate reticulation shows the most striking likeness to that of *T. albiceps*, so that the description of the latter may be applied to this; the only addition to be made would be, that the region immediately below the stigma is somewhat darker and a little less guttate. Thus the figure of the wing of *T. albiceps* gives quite a correct idea of the wing of the present species, except of its broader shape; moreover, the three posterior drops of the usual pyramid are smaller, and separated by larger intervals, and the intervals of all the six drops are perforated by much more numerous small drops. The third longitudinal vein is likewise not beset with bristles in this species.

*Hab.* West Point, N. Y. (Osten-Sacken).

*Observation.*—The systematic position of this species is exactly the same as that of *T. albiceps*.

**50. *T. platyptera* n. sp.** ♀.—Cinerea, abdomine quadrifariam nigro-maculato, capite pedibusque luteis, femoribus tamen posterioribus nigro-maculatis, scutello nigro- et flavo-variegato; alæ valde dilatæ, rotundato-ovate, totæ colore nigro guttato-reticulatæ, venâ longitudinali tertiâ non setosâ.

Gray, abdomen with four rows of black spots, head and feet yellow, the hind femora spotted with black; scutellum variegated with yellow and black; wings very broad, rounded-ovate, covered upon their whole surface with a reticulate black picture; third vein not bristly. Long. corp. cum terebrâ 0.21; long. al. 0.18.

Of this species I possess a single badly preserved specimen, and I would not have attempted to describe it, but for the circumstance that it is distinguished by a number of very peculiar characters, which render its recognition easy, even should the description be imperfect. Head yellowish; occiput immediately above the point of attachment somewhat blackish; on each side, near the basis of the antennæ, there is, on the border of the eye, a small, almost punctiform, blackish-brown transverse streak. The breadth of the front, which is distinctly narrowed anteriorly, is comparatively considerable, as it equals half the breadth of the head; the usual frontal bristles are black, those upon the vertical margin are yellowish-white. The third antennal joint is gently excised upon its upper side, and has a rather sharp anterior angle. Cheeks rather broad, with a black bristle, in front of which, along the lateral edge of the mouth, there is some black pile. Oral opening very wide; its anterior edge is but little drawn up, although rather projecting in the profile. Palpi very broad, reaching beyond the anterior edge of the mouth, beset with black and whitish-yellow hairs. Proboscis short geniculate, with moderately prolonged, stout flaps. The thorax of the specimen is greasy, and it is impossible to make any positive statement about its coloring and the pile upon it; the coloring upon the dorsum seems to have been more blackish; on the sides more brown; the pile seems to have been stubble-shaped, yellowish-white; all the bristles, upon the thoracic dorsum as well as upon the pleuræ, are black. The very convex, blackish scutellum has, upon the lateral margins and upon the tip, a broad yellowish border; the four blackish bristles of the scutellum are placed inside of this border upon blackish dots; the pair of those dots which is near the tip, although smaller, is connected with the black coloring of the



scutellum. Abdomen gray, with four rows of black spots. The spots of both intermediate rows are comparatively large rectangular triangles, one cathetus of which lies along the posterior margin of the segment, the other is parallel to the longitudinal axis of the abdomen; thus between both rows of spots, only a narrow gray intermediate line remains visible; the spots of the outer rows lie upon the lateral margins and also occupy the whole length of the segments, forming broad, uninterrupted lateral stripes. The whitish pile upon the abdomen is rather stubble-shaped; the comparatively long and strong bristles upon the posterior margin of the last segment are black. Venter somewhat dirty brick-red, gradually becoming blackish towards the lateral margins. Ovipositor flattened, broadly truncate at the end, shining black on the surface; the under side bright yellowish-red, with a black tip. Feet of an impure yellowish, the posterior femora on the under side with two well-defined blackish spots, and near the tip with a faded blackish spot. Wings very broad, of the same rounded elliptical shape as in *T. euryptera*. The black, guttate reticulation covers the whole wing to the extreme basis; along the whole posterior margin as far as the apex, there is a row of hyaline drops of middle size, separated by considerable intervals; beyond the apex, along the anterior margin, these drops become larger, their intervals growing smaller; in the marginal and costal cells they coalesce with a little drop placed behind them, so that, in these cells, the reticulation emits something like little rays, running towards the anterior margin; the stigma, upon the extreme basis, has a whitish crossline and includes a hyaline drop at the end; upon the whole inner side of the surface of the wing the black color is rather sparsely perforated by drops of middle and of the very smallest size; the latter are more numerous upon the posterior than upon the anterior half of the wing. The cells of the wings are all of an unusual breadth, and the crossveins accordingly of an unusual length; the distance between them is but little shorter than the middle crossvein; the second and third longitudinal veins are considerably divergent towards the end; upon the third I do not perceive any bristles.

*Hab.* Connecticut (H. F. Bassett).

*Observation.*—I leave this species provisionally in the genus *Tephritis*; the description shows sufficiently that it is a stranger there, whose affinities point towards the genus *Eurosta*. To

found a special genus for this single form would be premature, as there are several concurrent South American species, without the knowledge of which it is difficult to choose the characters upon which to establish the genus. To place the species in the genus *Eurosta* is likewise unadvisable, as the absence of bristles upon the third vein, and the not conical but flattened ovipositor are in conflict with the chief characters of *Eurosta*.

51. *T. aequalis* Loew. ♂ ♀. (Tab. X, f. 20.)—Dilute lutea, terebrâ concolore, tribus ultimis abdominis segmentis simul sumtis longiore, pilis, setisque totius corporis exalbidis; alæ colore ex-fusco nigricante, adversus costam et apicem in nigrum mutato, æqualiter guttato-reticulatæ, guttis confertis plerisque majusculis, picturâ marginis antice radiatâ, marginis apicalis subradiatâ; vena longitudinalis tertia non pilosa.

Pale yellowish; ovipositor of the female likewise yellow, longer than the last three abdominal segments taken together; pile and bristles of the whole body whitish; wings with a brownish-black guttate reticulation, black near the anterior margin and the apex; the drops are crowded and the majority of them are of a considerable size; the pattern of the picture consists of rays along the anterior border, which are less well-marked along the apex; the third vein is not beset with bristles. Long. corp. ♂ 0.22, ♀ cum terebrâ 0.25—0.26; long. al. 0.24—0.25.

SYN. *Trypeta aequalis* Loew, Monogr. etc., I, p. 86. Tab. II, f. 20.

*Hab.* Illinois (Kennicott). [Maryland, P. R. Uhler; Ohio, H. F. Bassett.—O. S.]

*Observation.*—The present species shows such a peculiar structure of the head and of the parts of the mouth, that I would not have hesitated to establish a separate genus for it, if I had had better preserved specimens for examination. The general appearance reminds of the species which I have united in the genus *Ictericæ*, but it differs in a smaller oral opening, a different shape of the wings, and a third longitudinal vein which is not beset with bristles. Not being able to assign a better position for it at present, I had the choice of leaving it in the genus *Tephritis* or of removing it to the genus *Euaresta*, proposed in the second observation to *Tryp. angustipennis*. The choice is not a very easy one, because, although the picture of the wings is distinctly radiate along the anterior margin as far as the apex, the apex itself and the space immediately behind it are more guttate than radiate. By all means, the question is more about

an artificial than about a final location of the species, as the latter will have to depend upon the results of a future investigation. The circumstance that the pyramid of drops beyond the stigma, usually well developed in the species collected in the subgenus *Tephritis*, is not distinctly marked here, decides me to place the species in *Euaresta*, although its affinities to the types of this subgenus may be very slight.

**52. *T. festiva* Loew.** ♂ ♀. (Tab. X, f. 21.)—Lutea, unicolor, alae inequaliter guttato-reticulatæ, in margine antico et apice radiatæ, picturâ in basi et disco sordide lutescente, prope marginem anticum et in apicali alarum triente fusco-nigrâ; terebra femina quatuor ultimis abdominis segmentis simul sumtis subæqualis, non depressa, adversus apicem valde angusta, superne nigra vel fusco-nigra, infra adversus basim rufa.

Clay-yellow, unicolorous, the reticulation of the wings unequally guttate, radiate along the anterior margin and on the apex, more dingy clay-yellow upon the basis and in the middle; brownish-black along the anterior margin of the wing and upon the apex; the ovipositor of the female is almost as long as the last four abdominal segments taken together, not flattened, very narrow at the tip, black or brown on the upper side, the under side red towards the basis. Long. corp. ♂, 0.17—0.18; ♀ cum terebrâ 0.20—0.23; long. al. 0.22.

**Syn.** *Trypeta festiva* Loew, Monographs, etc., I, p. 86. Tab. II, f. 21.

**Hab.** Pennsylvania (Osten-Sacken); Connecticut (Norton). [New Jersey, Mr. Iung; Illinois, Dr. Brendel; Ohio, H. F. Bassett.—O. S.]

**Observation 1.**—*Trypeta festiva* may be considered as a typical form of the genus *Euaresta*. As the third longitudinal vein of the wings is beset with spines, this species would have to be placed in the genus *Oxyphora*, in the classification adopted by me for the European species.

**Observation 2.**—Brazil possesses a conspicuous species closely allied to the present one, but more approaching the next following ones in the pattern of the picture of the wings. I let its description follow:—

***T. spectabilis* n. sp.** ♂ ♀. (Tab. X, f. 27.)—Tota luteola, terebra tamen obscure ferruginea, non depressa et quatuor ultimis abdominis segmentis subæqualis; scutellum quadrisetosum; alarum pictura nigra, in apice pulchre, sed breviter radiata, adversus angulum posticum rarius, in disco rarissime guttata, guttâ cellulae posterioris primæ unicâ; vena longitudinalis tertia setosa.

Altogether yellowish, except the ovipositor, which is dark ferruginous, not flattened, and nearly as long as the last four abdominal segments taken together. Scutellum with four bristles; the black picture of the wings shows, on the apex, handsome, although short, rays; it is sparsely guttate towards the posterior angle, very sparsely in the middle of the wing; the first posterior cell contains but a single drop; the third longitudinal vein is bristly. Long. corp. 0.26—0.27; long. al. 0.26.

A rather conspicuous species, of the same coloring as the European *T. valida* Lw. With the exception of the ovipositor, it is altogether yellowish, only the basis of the abdomen is sometimes brownish. Front of a middle breadth and somewhat convex; its brownish-yellow or reddish-yellow bristles are comparatively strong; the frontal lunule rather large. Antennæ short, by far not reaching the edge of the mouth; the second joint bears a conspicuous bristle; the anterior edge of the mouth considerably drawn up, but not very projecting in the profile. Eyes not very high; cheeks broad. Oral opening rounded, rather large; proboscis not geniculate; palpi rather broad, reaching abundantly as far as the anterior edge of the mouth. The short pile on the thorax is partly pale ferruginous, partly pale yellowish-red; the usual bristles are pale yellow or brownish-yellow. The somewhat convex scutellum has four bristles. Metathorax and pleuræ yellow, like the rest of the body. Abdomen likewise uniformly yellow, but there are specimens the abdomen of which is infuscated at the basis; the pile on the abdomen is like that on the thorax, only its coloring is more yellowish. The stout, conical ovipositor is not flattened at all, about as long as the last four abdominal segments taken together; in paler specimens it is reddish-brown with a black tip; in darker specimens it is rather brownish-black; it is beset, as far as the tip, with comparatively long pile, which assumes a more yellowish hue near the basis, a more brownish one near the tip; in darker specimens it is sometimes blackish-brown. Feet altogether yellow. Wings hyaline with a very much expanded and very little perforated black reticulation, which is radiated at the apex of the wing. The root of the wings is not spotted nearly as far as the end of the small basal cells; the costal cell contains a gray crossline near the humeral crossvein, a brownish-black crossband upon its middle, and a crossline of the same color at its extreme end; the obliterate end of the auxiliary vein, running perpendicularly towards the margin of the wing, is rather hyaline; the stigma is altogether black and does not include any hyaline drop; immediately beyond the stigma near the anterior margin, there are two cuneiform hyaline spots, the first of which is a little broader than the second and crosses the second vein a little further; between these spots and the end of the second vein the brownish-black coloring is entirely unbroken; five short brownish-black rays of almost equal length run towards the apex; the first ends between the second and third longitudinal veins, the next two coincide with the

ends of the third and fourth veins; the last two cross the second posterior cell; the last of all is connected with the remaining brownish-black coloring by a narrow brownish-black bridge and sometimes interrupted at the basis; upon the anterior side of the fourth vein there are only two hyaline drops, the one below the stigma, the other between both cross-veins; in the third posterior cell there are six hyaline drops, the one of which is at its extreme basis and the others upon its latter half; some of the latter drops are sometimes coalescent; in the posterior angle there are, moreover, four or five hyaline drops. The small crossvein is almost perpendicular and is nearly opposite the last third of the discal cell; the posterior crossvein likewise is rather perpendicular; the third longitudinal vein is distinctly bristly.

*Hab.* Brazil (collection v. Winthem).

**53. *T. bella* Lw.** ♂ ♀. (Tab. X, f. 23.)—Luteo-cinerea, capite, pedibus, abdomineque flavis, hoc apicem versus nigricante; setæ scutelli quatuor; alarum pictura nigra, in margine antico et apice pulchre radiata, prope marginem posticum paulo confertius, in disco rarissime guttata, guttæ cellulæ posterioris primæ plane nullæ; vena longitudinalis tertia setosa.

Yellowish-gray; head, feet, and abdomen yellow; the latter blackish towards the end; the black picture of the wings handsomely radiate on the anterior margin and the apex; in the vicinity of the posterior margin with numerous drops, upon the middle of the wing with very few, in the first posterior cell with none; third longitudinal vein bristly. Long. corp. ♂, 0.12—0.13, ♀ cum terebrâ 0.13—0.15; long. al. 0.11—0.12.

*Syn.* *Trypeta bella* Loew, Monographs, etc., I, p. 88. Tab. II, f. 23.

*Hab.* New York (Fitch); Washington (Osten-Sacken); Wisconsin, etc. [Rather common everywhere in the U. S.—O. S.]

*Observation.*—Closely related to *T. festiva*, and, as to its systematic location, the remarks appended to that species are also applicable here.

**54. *T. timida* Lw.** ♂. (Tab. X, f. 25.)—Lutea, metanoto pleurisque ex-nigro fuscis, capite pedibusque flavis; setæ scutelli quatuor; alarum pictura nigra, in apice pulchre radiata, prope marginem posticum rare et in disco rarissime guttata; guttæ cellulæ posterioris primæ unicæ; vena longitudinalis tertia setulis paucis brevissimis instructa.

Clay-yellow, metathorax and pleuræ blackish-brown; head and feet yellow; four bristles upon the scutellum; the black picture of the wings is prettily radiated at the tip, in the vicinity of the posterior margin sparsely, and upon the middle of the wing very sparsely guttate, in the first posterior cell with a single drop; the third longitudinal vein is

beset with extremely short and scarce bristles. Long. corp. 0.17; long. al. 0.16.

SYN. *Trypeta timida* Loew, Dipt. Am. Cent. II, No. 76.

Clay-yellow; the coloring of the head is of a purer yellow, but the middle of the occiput is grayish. Front comparatively narrow; its pale brownish bristles are strong and long. Antennæ yellow, not reaching to the oral edge; anterior corner of the third joint rounded; arista comparatively thin, its pubescence so short, that, to the naked eye, the arista appears bare. Face excavated; the anterior edge much drawn upwards, but little projecting in the profile. Eyes elongated-rounded; cheeks very narrow. Oral opening of a middle size, rather round; the yellowish proboscis not geniculate, short; palpi short, yellowish. The upper side of the thorax is clothed with pale yellowish hairs; upon its middle there is a weak trace of a very broad grayish stripe, which, however, in less denuded specimens, may be hardly visible. The bristles upon the upper side of the thorax are pale brownish; upon its middle there are three pairs. The yellow scutellum bears four bristles. The ground color of the metathorax is blackish-brown, but assumes a grayish aspect from a thin covering of pollen. The pleuræ have a similar coloring, but towards the upper margin, it becomes more yellow, and below the root of the wings there also is a spot of dingy yellow. The clay-yellow abdomen shows, in the described specimen, upon the last two segments brownish spots, which, however, seem to be the result of some lesion. Feet yellow. Wings rather broad with a brownish black, very sparsely reticulated picture, which is radiated on the apex; the root of the wings is very sparsely spotted before the end of the two small basal cells; the costal cell, near its basis, has a blackish transverse line, a brownish-black one beyond its middle, and another brownish-black one upon its extreme end; the obliterate end of the auxiliary vein, which runs perpendicularly towards the anterior margin, is rather hyaline; stigma brownish-black with a yellow crossline in the vicinity of its end; immediately beyond the stigma there are two cuneiform hyaline indentations, which extend from the margin to the second longitudinal vein; the latter is somewhat remote from the margin; between the second of these indentations and almost the end of the second vein, the brown color is not perforated; along the apex, the

brown color emits five brown rays of almost equal length. The first of these rays ends a little before the middle of the distance between the tips of the second and third veins; the two next ones, which are a little expanded at the tip, lie on the ends of the third and fourth veins, the last two in the second posterior cell; the last of these rays, in the vicinity of its origin, is not quite well separated from the remaining brownish-black picture. The hyaline drops are rather large, but few in number; there are two between the third and fourth longitudinal veins, the first before the small crossvein, the second less far beyond it; the discal cell also contains but two drops, placed under the small crossvein and nearer to the posterior side of the cell; the third posterior cell has a drop at its extreme basis and five considerable ones in the posterior angle of the wing, which, however, are less conspicuous, because the dark coloring in that region is more faded. The distance of the first and second longitudinal veins from the margin is a little larger than usual; the second and third veins are strongly diverging towards the end; a weaker divergency exists between the third and fourth veins; the two crossveins are perpendicular and straight; the small crossvein is almost twice as far from the proximal end of the discal cell as from the distal end. In my first description of this species I said that the third vein was not beset with bristles; a more attentive examination of the specimen, however, revealed to me, on one of the wings, a few very short bristles, which are either rubbed off on the other wing, or else in a situation which does not allow their close scrutiny; the first posterior cell does not contain a conspicuous concavity, like that in *T. bella*; and the corresponding spot is not darker than its surroundings.

*Hab.* Mexico (collect. v. Winthem).

*Observation 1.*—The systematic position of *T. timida* is exactly the same as that of *T. festiva* and *bella*.

*Observation 2.*—The next relative of *T. timida* is a Brazilian species, which can be very easily mistaken for it; and in order to prevent this confusion, I let its description follow here:—

***T. obscuriventris* n. sp. ♀.** (Tab. X, f. 26.)—Ex luteo cinerea, capite pedibusque lutescentibus, abdomine ex piceo nigro et nitido, terebrâ concolore, tribus ultimis abdominis segmentis simul sumptis aequali; setæ scutelli quatuor; alarum pictura nigra, in apice pulchra

radiata, prope marginem posticum raro et in disco rarissime guttata, guttâ cellulæ posterioris primæ unicâ; vena longitudinalis tertia setosa.

Yellowish-gray, head and feet yellow, abdomen shining brownish-black, ovipositor concolorous, as long as the last three abdominal segments taken together; scutellum with four bristles; the black picture of the wings handsomely radiated on the apex, sparsely guttate in the vicinity of the posterior margin, very sparsely in the middle of the wing; a single drop in the first posterior cell; the third longitudinal vein beset with bristles. Long. corp. cum terebrâ 0.20; long. al. 0.16.

Head, including palpi, proboscis, and antennæ, yellow; only the occiput for the most part grayish. Front comparatively narrow; its brown bristles are long and strong. Antennæ not reaching to the edge of the mouth; third joint rounded at the end; arista comparatively thin, appearing bare to the naked eye, as the pubescence is very short; face excavated; the oral opening hardly of middle size, round; proboscis short, not geniculate. Palpi of middle size; the ground color of the thorax is altogether black, including even the humeral callosities, but this color is so much concealed under ochre-yellow pile and pulverulence, that it assumes a yellowish-gray hue; upon the pleuræ and especially on the metanotum the dark ground color is more apparent. The scutellum, bearing four bristles, is yellow to a considerable extent at the tip; the abdomen is of a shining brownish-black and shows weak traces of a yellowish-brown pollen; the pile is short and scattered, of mixed yellow and black hairs; the latter prevail or seem to do so, as many of the yellow hairs assume a blackish hue when they do not reflect the light. The flat, not very pointed ovipositor is pitch-black, shining, about as long as the last three segments of the abdomen taken together, beset as far as the tip with a brown pubescence, appearing black in some directions. Feet yellow. The comparatively rather broad wings have a brownish-black, very sparsely guttate picture, which is handsomely radiate at the tip; the root of the wings, as far almost as the end of the small basal cells, is hardly spotted at all; the costal cell, quite near the humeral crossvein, has a grayish crossline, a brownish-black one upon the middle and one of the same color, but narrower, at the end; the obliterate end of the auxiliary vein, running perpendicularly towards the anterior margin, is rather hyaline; stigma altogether brownish or only with a trace of a very small yellowish drop in the vicinity of its apex, near the anterior margin; immediately beyond the stigma there are two hyaline indentations on the anterior margin, the first of which alone reaches the rather distant second longitudinal vein; before the end of the second longitudinal vein near the anterior margin, there always is a considerable hyaline drop, which *T. timida* does not possess; five rays of almost equal length occupy the apex; the first of them reaches the margin nearer to the end of the second than of the third vein; the two following are somewhat expanded at the tip and end upon the tips of the third and fourth veins; the last two rays



cross the second posterior cell, and the last of them is a little broader than the preceding one and generally connected in the vicinity of its root with the remaining brownish-black picture by a brownish-black bridge, which cuts off the end of the hyaline indented interval in the shape of a drop. The hyaline drops are of a considerable size, but not very numerous; two are placed between the third and fourth veins, the one before, the other less far behind the small crossvein; in the same way there are only two drops in the discal cell, placed upon its posterior side, below the small crossvein; the third posterior cell contains a drop near its extreme basis and five considerable drops upon its distal half; finally four drops are situated in the posterior corner of the wing, which, however, are less conspicuous on account of the less dark coloring surrounding them. The first and second longitudinal veins are somewhat more distant from the anterior margin than usual; the second and third are strongly divergent towards the end; a lesser divergency exists between the third and fourth; both crossveins are perpendicular and straight; the small one is twice as far from the basis as from the end of the discal cell; the third vein is distinctly bristly; there is no distinct concavity in the first posterior cell, and the spot where it occurs in some species is not darker than the surroundings.

*Hab.* Brazil (coll. v. Winthem).

**55. *T. melanogastra* Lw.** ♂ ♀. (Tab. X, f. 24.)—Luteo-cinerea, abdomine nigro, capite pedibusque flavis; setæ scutelli duæ; alarum pictura nigra, in apice radiata, prope marginem posticum paulo confertius, in disco rarissime guttata, guttæ cellulæ posterioris primæ unicæ; vena longitudinalis tertia non setosa.

Yellowish-gray, abdomen black, head and feet yellow; scutellum with two bristles; the black picture of the wings with rays at the tip, more densely guttate in the vicinity of the posterior margin, very sparsely in the middle, and with a single drop in the first posterior cell; the third longitudinal vein is not bristly. Long. corp. ♂ 0.09, ♀ cum terebrâ 0.12; long. al. 0.12.

*SYN. Trypeta melanogastra* Loew, Monographs, etc., I, p. 90. Tab. II, f. 24.

*Hab.* Cuba (Poey).

*Observation 1.*—Two misprints must be corrected in the description in the first volume of these Monographs: the figure of the wing is quoted fig. 23, instead of 24, and on page 91, line 19, "fifth" must be read, instead of "first." Moreover, it must be added that the figure was drawn from a female specimen. The relation of *T. melanogastra* to *T. mexicana* Wied. will be explained under the head of the latter.

*Observation 2.*—*T. melanogastra* belongs, together with the

preceding species, to the genus *Euaresta*; it differs from them in the presence of only two bristles upon the scutellum and in the absence of bristles upon the third vein. In the system adopted by me some time ago for the European Trypetidæ, this species, on account of the somewhat prolonged flaps of its proboscis and of the bareness of the third vein, would have to be placed in the genus *Oxyna*. I do not believe that its generic separation from the preceding species is to be recommended. A close relative of this species is a Brazilian one, which differs, however, in its wings being comparatively much narrower and its body more slender. I let its description follow:—

**T. tenuis** n. sp. ♀. (Tab. X, f. 29.)—*Angusta, luteo-cinerea, capite pedibusque gracilibus flavis; setæ scutelli duæ; alæ pro portione angustæ, picturâ nigrâ in angulo postico elutâ, in apice radiatâ, prope marginem posticum confertius, in disco rarissime guttatâ, guttâ cellulæ posterioris primæ unicâ.*

Slender, yellowish-gray; the head and the slender feet are yellow; wings comparatively narrow, with a black picture, which is faded on the posterior angle, radiate on the apex, more densely guttate near the posterior margin, very sparsely in the middle of the wing, where the first posterior cell contains but a single drop; third longitudinal vein not bristly. Long. corp. cum terebrâ 0.13; long. al. 0.13.

Body remarkably narrow and slender. Ground color blackish, but so much covered with yellowish pile and pulverulence that thorax and abdomen have a yellowish-gray appearance. Head, including antennæ, palpi, and proboscis, yellow; occiput, on its upper half, with a large blackish-gray spot. The front a little more than of medium breadth; its usual bristles blackish. Face somewhat excavated and narrower than the front. Antennæ somewhat broad, not quite reaching the edge of the mouth, which is somewhat drawn upwards, but does not project distinctly in the profile. Eyes comparatively large and rounded; cheeks very narrow. The palpi reach to the anterior edge of the mouth. The suctorial flaps seem to be somewhat injured in the described specimen, so that I am not quite sure whether the proboscis is geniculate or not; I believe that, in uninjured specimens, it would look short-geniculate; the dark color which the flaps have in the described specimen is certainly an unnatural one. The ground color of the thorax is altogether blackish, even upon the humeral corners; its upper side has a yellowish-gray appearance, in consequence of its pulverulence and pile; on the metathorax and the pleuræ the coloring is more blackish-gray. The scutellum is of the same coloring with the upper side of the thorax, the extreme apex only somewhat tinged with yellow; it bears only two bristles, which, like those of the

thorax, are blackish. Abdomen narrow, but little more gray than the upper side of the thorax, without any rows of dark spots, but on each side of the second segment with a but little apparent yellow spot; the short pile as well as the longer hairs upon the posterior margin of the last segment are yellowish. The flat, shining black ovipositor is as long as the whole abdomen, and beset with dark pile. The feet are slender and yellow, as well as the coxae. Wings rather hyaline, with a brownish-black very continuous reticulation; the root of the wings is not distinctly spotted as far as the end of the small basal cells, but somewhat dusky; upon the middle of the costal cell there is a blackish-brown crossline; the stigma does not contain any hyaline drop, but its inner basal end is very slightly tinged with yellow; immediately beyond the stigma there are, near the anterior margin, two drop-like hyaline spots; each of them has a small hyaline drop under it, below the second longitudinal vein; the second one is smaller; before the end of the second vein there is no hyaline drop; near the tip of the wing the apex shows the usual five rays, which have a considerable breadth, and the last of which is connected by a bridge with the remaining brownish-black coloring, which thus isolates the inner end of the hyaline interval in the shape of a drop; the anterior side of the fourth vein shows two conspicuous spots, one immediately before, the other not far beyond, the small crossvein; in the discal cell there are three hyaline drops along the fifth vein, the middle one being the largest and lying almost under the small crossvein; above the last of these drops there is sometimes one little drop more; the extreme basis of the discal cell also shows an indistinct, sometimes double, little drop; the third posterior cell contains but a few large drops, which are partly coalescent in couples; the posterior corner of the wing is likewise guttate, but the drops are much less apparent here, owing to the pale ground color. The small crossvein is hardly half as distant from the end of the discal cell as from the basis; the third longitudinal vein is not bristly.

*Hab.* Brazil (collect. v. Winthem).

**56. *T. mexicana* WIED.** ♂. (Tab. X, f. 28.)—Luteo-cinerea, abdomen nigro, adversus basim interdum sordide luteo, capite pedibusque flavis; setæ scutelli duæ; alarum pictura nigra in apice radiata, radiis tamen in marginem posticum excurrentibus minus explicatis et minus liberis, prope marginem posticum confertius, in disco rarissime guttata, guttâ cellulæ posterioris primæ unicâ; vena longitudinalis tertia non setosa.

Yellowish-gray, abdomen black, sometimes of a dingy clay-yellow towards the basis; head and feet yellow; scutellum with two bristles; the black picture of the wings is radiate on the apex, but the rays in the vicinity of the posterior margin are less developed and less free; the drops near the posterior margin are more numerous, those in the middle of the wing very sparse; the first posterior cell contains but a single drop;

third longitudinal vein not beset with bristles. Long. corp. 0.09—0.10; long. al. 0.12.

SYN. *Trypeta mexicana* WIEDEMANN, Auss. Zweifl. II, p. 551.

Yellowish-gray. Front of a more vivid yellow, upon the lateral margin with a rather indistinct whitish pollen; the usual bristles upon it are black; those on the vertical margin pale yellowish. Eyes rounded ovate; cheeks very narrow. Face distinctly excavated, the anterior edge of the mouth is strongly drawn upwards and rather projecting in the profile. The bristles of the thoracic dorsum seem to be black, in reflected light they appear brown; in the middle of the dorsum there are but two pairs, the first of which is very much advanced. The short pile upon the thorax and the bristles upon the pleuræ are pale yellowish. Scutellum of a dingy-yellow at the tip, and with two bristles. Abdomen black (a male from Texas shows a dingy yellowish coloring at the basis), appearing almost grayish-black under a very thin pulverulence, which does not prevent it from retaining some lustre; its pile is almost without exception pale yellowish. Feet and coxæ rather saturate yellow, the pile and bristles upon them yellowish. Wings hyaline with a brownish-black picture, which is almost completely radiate towards the end; however, the rays ending in the posterior margin are less developed and less separated from each other than is the case in a normal pattern of this kind; the hyaline intervals between the rays distinctly show that they owe their origin to confluent drops. The root of the wings is but little spotted as far as the beginning of the stigma and the end of the small basal cells; the adjoining portion of the picture is almost without drops, so as almost to assume the appearance of an oblique crossband, running towards the posterior margin; the stigma at its basis contains a small hyaline drop; immediately beyond it, in the marginal cell, there are two square hyaline spots, separated by a brownish-black line; under the first of them the submarginal cell contains a considerable hyaline drop; the anterior side of the fourth vein shows two large drops, the one a little before, the other a little beyond the small crossvein; the discal cell, on the fifth vein, contains three drops, the first of which is the smallest and the second the largest; the third posterior cell contains, besides the small hyaline spot at the basis, four drops of considerable size, three of which are placed at the posterior side of the fifth longitudinal vein; in the poste-

rior corner likewise there are several drops. The third longitudinal vein is without bristles and the small crossvein corresponds to the second third of the discal cell.

*Hab.* Mexico (Berlin Museum); Texas (Belfrage).

*Observation.*—The above description, as well as the figure, are prepared after the specimen in the Berlin Museum, which is the original type of Wiedemann's description. Two males, sent by Mr. Belfrage from Texas, agree in all respects, with the only exception that, in one of them, the basis of the abdomen is dingy yellowish. I am in doubt whether *T. mexicana* is not the male of the Cuban species, which I described as *T. melanogastra*, and of which I possess a very imperfect soiled and faded specimen, not sufficient to enable me to form an opinion. A part of the apparent differences may be due to this condition of the specimen. The description of *T. melanogastra* in the first volume of the Monographs says that there is sometimes a clear drop immediately before the end of the second vein; I must complete this statement by saying that this drop exists in the two females of my collection, but not in the male; whether this difference in the picture of the wings is a constant, or at least an ordinary, sexual distinction, I am not prepared to say. The development of the rays ending in the posterior margin in the female of *T. melanogastra* is not even always as complete as Tab. X, f. 24 (drawn after a female specimen) represents it; and the male of my collection approaches very much in this respect the typical male of *T. mexicana*. The differences which fig. 24 and 28 show in the development of the drops in the vicinity of the posterior margin, are of not much importance for specific distinction, as the reticulation in that vicinity is very variable in many species. All these circumstances seem to militate very strongly in favor of specific identity. The only notable difference which I can perceive in the typical male of *T. mexicana* (in the Berlin Museum) as well as in the two males from Texas in my collection, when compared to my single male specimen and my two females of *T. melanogastra*, consists in the position of the hyaline drop in the submarginal cell, which in *T. mexicana* is placed under the first of the two hyaline indentations situated in front of it, while in *T. melanogastra* it is under the brown line which separates the two indentations. This difference is not important and not equally distinct in all specimens, and it is probable that the

comparison of a larger number of them will still more prove its insignificance. There will be no reason then to maintain *T. melanogastra* as a separate species.

**57. *T. pura* n. sp. ♀.**—Cinerea, thorace fusco-vittato, pilisque albidis instructo, abdomine nigro-piloso, capite pedibusque ex fusco-luteis; setæ scutelli quatuor; alæ albidæ, præter basim et angulum posticum colore nigro guttato-reticulatæ, in apice radiatæ, guttis in dimidio posteriore confertis, in anteriore rarissimis, tribus tamen majoribus ultra stigma in triangulum dispositis; vena longitudinalis tertia non pilosa.

Gray, thorax with brown longitudinal stripes and white pile, abdomen with black pile, head and feet brownish-yellow; scutellum with four bristles; wings whitish, except the basis and the posterior angle, with a black reticulation, which is radiate on the apex; it is numerously guttate upon the posterior region, sparsely on the anterior; immediately beyond the stigma there are three large drops, disposed in a triangle; the third longitudinal vein is not bristly. Long. corp. cum terebrâ 0.22; long. al. 0.19.

Gray; abdomen more blackish-gray. Head clay-yellowish; the front more brownish-brick color (which may be due to a discoloration of the described specimen); it is remarkably broad, almost half as broad as the whole head; the usual bristles upon it are black, the bristles on the vertical margin whitish. Antennæ almost brownish-brick color; the short pile on the second segment is whitish; that on the third is blackish; the third joint is gently excised on the upper side; arista blackish-brown. Oral opening of medium size; its anterior edge somewhat drawn upwards and a little projecting in the profile. Proboscis not geniculate; palpi not quite reaching to the anterior edge of the mouth, with black pile. Eyes rounded, their perpendicular diameter but little longer than the horizontal one. Cheeks of a moderate breadth. Thoracic dorsum with indistinctly limited, although well-marked, rather dark brown longitudinal stripes; its short pile is whitish, the bristles black. Scutellum grayish-brown, with a broad grayish border on the sides, and with four black bristles. The ground color of the abdomen is black, the posterior margin of each segment brick-red, especially the last segment, where this border is the broadest; its pile is yellowish-white in the vicinity of the basis only, elsewhere without exception black. Ovipositor flattened, rather broadly truncate at the end, shorter than the last two abdominal segments

taken together, red or brownish-red, with a black border at the tip; its pile is black, whitish on the basal corners only; on the under side there is some whitish pile, conspicuous for its greater length. The whole venter has a brick-brownish coloring; the pile upon it seems to be of the same color as that on the upper side. Feet brownish clay-yellow, almost brownish, brick color. Wings in the reflected light altogether milky-white, in a transmitted light whitish-hyaline. The picture of the wings is black; it does not cover the whole posterior corner of the wing and the longitudinal half of the third posterior cell, contiguous to it, with the only exception of a very striking black border along the sixth longitudinal vein; above this the reticulation begins a little beyond the little basal cells, and, at the anterior margin, with the black stigma, which contains no drops. The space thus left free contains but a few isolated little black spots. The pattern of the picture recalls the European *T. pulchra* Lw. (compare my *Trypetidæ*, Tab. XXIV, f. 2); in the shape and position of the two portions of it which are almost without any drops, it is still more like *T. conjuncta* Lw. (comp. *Trypetidæ*, Tab. XXIV, f. 1), only the drops upon the posterior half of the wing are much more numerous than in those two species; the first almost dropless space begins at the stigma and runs obliquely to the small crossvein; the second is limited posteriorly by the fourth vein and becomes completely confluent with the first space upon and immediately behind the third vein; upon the anterior margin both spaces are separated, immediately beyond the stigma, by a large, somewhat triangular drop, and by a rounded drop which follows it; a third drop, of considerable size, in the submarginal cell, forms a triangle with the other two; the submarginal cell contains, moreover, under the second drop near the anterior margin, another little drop; the second almost non-reticulated space contains two drops on the anterior margin, the first of which is a little distance before, the second immediately beyond the end of the second longitudinal vein, and sends four tolerably well-developed rays towards the margin; the first two of these coincide with the ends of the second and third longitudinal veins, the last two are in the second posterior cell; the first basal cell shows only a row of drops along its posterior side; the first posterior cell contains, besides a few very small drops in the vicinity of its posterior side, a large drop, placed a little before

the end of the discal cell; the numerous drops of the discal cell are of very unequal size, show an inclination to be arranged in two rows and leave more black space on the anterior than on the posterior side; in the third posterior cell the somewhat lacerated reticulation is confined in a very marked manner, to the somewhat larger longitudinal half of the cell, contiguous to the discal cell; both crossveins are perpendicular and less distant from each other than the length of the small crossvein; the third vein is not bristly.

*Hab.* Massachusetts (Sanborn).

*Observation.*—I place this species in the genus *Euaresta*, on account of the reticulation, which is radiate on the apex. While *T. festiva*, *spectabilis*, *bella*, *obscuriventris*, *mexicana*, *melanogastra*, and *tenuis*, all closely related, form the solid nucleus of the genus, the connection of *T. pura* with it is a purely artificial one, based upon a resemblance in the picture of the wings; it has more real relationship to those *Urelliæ*, the scutellum of which has four bristles. But in order to place *T. pura* in that genus, it will be necessary to modify its definition, which will have to be done in further developing the system of the *Trypetina*. According to the system adopted in my Monograph of the European *Trypetidæ*, this species would have to be placed in the genus *Tephritis*.

58. *T. abstersa* Lw. ♂ ♀. (Tab. XI, f. 7.)—Cinerea, capite, pedibus et scutello setis quatuor instructo, flavis; alarum dimidium basale colore cinereo obsolete reticulatum, apicale maculâ nigrâ, pulchre radiatâ, ornatum.

Gray, head, feet, and the four-bristly scutellum yellow; the proximal half of the wings with a faded gray reticulation, the distal half with a black, handsomely radiated spot. Long. corp. ♂ 0.12—0.13, ♀ cum terebrâ 0.13—0.14; long. al. 0.12—0.13.

SYN. *Trypeta abstersa* Loew, Dipt. Amer. Cent. II, No. 77.

The ground color of thorax and abdomen is rather variable; generally it is altogether blackish; the humeri, often also the upper side of the pleuræ, the scutellum, the basis of the abdomen, and the posterior margins of its segments usually are, to a greater or lesser extent, clay-yellowish; sometimes the yellowish color is so extended, that, except upon the thoracic dorsum and the meta-thorax, hardly any blackish is left; nevertheless the ground color of the thorax and of the abdomen is so covered up by a pale



pulverulence and pale yellowish pile, that thorax and abdomen assume a uniform grayish-yellow hue. Head yellow, except the middle of the occiput, which shows a large blackish-brown spot. Front rather broad, attenuated anteriorly; the usual bristles very pale yellowish. Antennæ dark yellow, not quite reaching the somewhat projecting edge of the mouth; the anterior corner of the third joint rounded. The broad oral opening rather round. Proboscis and palpi short, not reaching beyond the anterior edge of the oral opening; proboscis not geniculate. The upper side of the thorax is beset with brown or brownish bristles. Scutellum yellow, with four bristles. Ovipositor reddish-yellow, flat, rather broad, somewhat shorter than the last two abdominal segments taken together, beset with whitish pile. Feet yellow, front femora with yellowish bristles. Wings hyaline; their proximal half is somewhat less limpid than the distal one, rather uniformly pictured with a loose, gray reticulation, which is faintest near the anterior margin; the distal half of the wing is occupied by the radiated black spot, characteristic of the genus *Urellia*, which extends from the anterior margin to the fourth vein; this spot emits two narrow oblique rays, running towards the anterior margin; the first begins at the anterior end of the small crossvein and runs to the end of the colorless stigma; the second, shorter one, reaches the margin in the middle between the tip of the stigma and beginning of the black spot itself; three rays run towards the apex, of which the ends of the two posterior ones coincide with the ends of the third and fourth veins, where they are somewhat expanded; the shortest, anterior ray, sometimes separated from the body of the black spot by two drops only, reaches the anterior margin between the ends of the second and third veins; the first two of the rays running towards the posterior margin cross the middle of the second posterior cell; the narrower third ray follows the posterior crossvein and is sometimes connected with the second by a gray bridge, which divides the hyaline indentation between them into two large drops; in the first posterior cell, above and a little before the posterior crossvein there is a large hyaline drop, which, upon its proximal side, is bordered with black or blackish. The third vein is not bristly.

*Hab.* North America (coll. Winthem); Cuba (Gundlach).

*Observation 1.*—I have described *T. abstersa* in the Dipt. Am.

Cent. II, after a North American female in the Winthem collection. I have received since several specimens of a Cuban *Trypeta* from Mr. Gundlach, which I suppose to be the same species. They are somewhat smaller, have a more extended blackish coloring, and the incomplete gray reticulation of the proximal half of the wing is considerably darker towards the posterior margin. Unfortunately, I have not the original specimen of the Winthem collection at hand for comparison, and, therefore, cannot finally decide about the specific identity. In the figure of the wing, the gray reticulation of its proximal half is represented by the engraver as too distinctly guttate, in fact more so than is the case in either the Cuban or in the typical specimen.

*Observation 2.*—*T. abstersa* belongs in the genus *Urellia*, and in the group of species having four bristles upon the scutellum. The more developed picture on the basal half of the wing requires, however, that it should be placed on the limit of this genus and in the close relationship of *T. pura* and similar species.

**59. *T. polyclona* n. sp.** ♀.—Albido-cinerea, capite pedibusque flavis; setæ scutelli quatuor; alæ hyalinæ, præter dimidii apicalis maculam magnam nigram, radios novem emittente, duos in costam, duos in apicem et quinque in marginem posticum excurrentes.

Whitish-gray, head and feet yellow. Scutellum with four bristles; wings hyaline, upon their distal half with a large black spot, which emits nine rays, namely, two to the anterior margin, two to the apex, and five to the posterior margin. Long. corp. cum terebrâ 0.15; long. al. 0.14.

Of this handsome species I possess only a single, rather worn, specimen. Head yellow, of the same structure as in *T. abstersa*, only the front comparatively narrower. Thorax, scutellum, and the whole abdomen whitish-gray. The bristles on the scutellum are broken off, nevertheless it is apparent that they were four in number. Ovipositor black, somewhat longer than the last two abdominal segments taken together. Feet yellow. Wings whitish-hyaline, upon their distal half with a large spot, emitting nine rays towards the margin of the wing; the spot is a little removed from the small crossvein, near which, in the first basal cell, there is an irregular blackish spot; the first ray runs from the anterior end of the small crossvein in an oblique direction through the otherwise colorless stigma, to the costal vein, which, at the place where it is thus reached, has a conspicuously black

color; the second ray also runs obliquely to the anterior margin, which it reaches before the middle of the distance between the ends of the second and third longitudinal veins; the third and fourth rays run towards the apex and end upon the ends of the third and fourth veins; among the five rays running towards the posterior margin, the first two cross, as usual, the second posterior cell, and the third follows the posterior crossvein; the fourth originates but little beyond the posterior crossvein, exactly at the place where the spot incloses a large drop, placed on the anterior side of the fourth vein; it runs almost parallel to the preceding ray as far as the posterior margin; the last ray finally originates at the posterior end of the small crossvein, and runs in a very oblique direction, diverging from that of the preceding ray, towards the margin, in the vicinity of which the intensity of its coloring is diminished; the drops, through the coalescence of which the hyaline intervals between the last three rays are formed, are indicated by the irregular outlines of the last two rays; besides the drop already mentioned, which is situated on the anterior side of the fourth vein, the black spot contains a second drop immediately beyond the end of the second vein.

*Hab.* Cuba (Gundlach).

*Observation 1.*—*T. polyclona* is a typical *Urellia*, and belongs, as well as *T. abstersa*, to the division with four bristles on the scutellum.

*Observation 2.*—One would almost be tempted to recognize in this species the *T. mevarna* Walker, List, etc., IV, p. 1023, from Florida, which is an *Urellia*. But a positive identification is prevented by the circumstance that Walker mentions the feet as having black pile, which is not at all the case in my species.

**60. *T. solaris* Lw. ♀.** (Tab. X, f. 19.)—Albido-cinerea, capite pedibusque flavis, setæ scutelli duæ; alæ albo-hyalinæ, prope venam transversalem mediam subinfuscatæ, in dimidio apicali maculâ magnâ nigrâ ornatæ, guttas duas includente et radios septem integros, octvuamque abbreviatum emittente.

Whitish-gray, head and feet yellow; scutellum with two bristles; wings whitish-hyaline, brownish in the vicinity of the small crossvein, upon the distal half with a large black spot, which contains two drops and emits eight rays, the last of which alone is shortened. Long. corp. cum terebrâ 0.17; long. al. 0.16—0.17.

*Syn.* *Trypeta solaris* Loew, Monogr., etc., I, p. 84. Tab. II, f. 19.

*Hab.* Georgia (Osten-Sacken).

*Observation.*—To the above-quoted description I must add, in order to facilitate the distinction from the following species, that the rays running towards the posterior margin are strongly marked, and that the last of them ends abruptly at the fifth vein (the distance is too large in the figure); that there is no trace of a blackish spot near the fifth vein, but that, in the discal cell, immediately beyond its middle, there is an exceedingly minute gray mark. This species is a typical *Urellia*, of the group with two bristles on the scutellum.

**61. *T. actinobola* n. sp. ♂.**—Albido-cinerea, capite pedibusque flavis, setæ scutelli duæ, alæ totæ albo-hyalinæ, præter punctum nigrum venæ quintæ oppositum in dimidio apicali maculâ magnâ nigrâ ornatæ, guttas duas includente et radios septem integros, octavumque abbreviatum emittente.

Whitish-gray, head and feet yellow, scutellum with two bristles; wings altogether whitish hyaline, with the exception of a punctiform dot on the fifth longitudinal vein and of a large black spot upon the distal half of the wing; the latter contains two drops and emits eight rays, the last of which alone is abbreviated. Long. corp. 0.13—0.14; long. al. 0.15.

This species is so very like the preceding that the mention of the differences in the picture of the wings will be sufficient for its recognition. There is no trace here of the brownish coloring which, in *T. solaris*, surrounds the small crossvein, and likewise none of the minute mark in the first basal cell, near the small crossvein; the little dot beyond the middle of the discal cell which occurs in *T. solaris* is likewise wanting here; but instead of these, there is, on the posterior side of the fifth vein, nearly under the end of the first vein, a very well-marked punctiform blackish dot; the large black spot on the apex is very like that in *T. solaris*, with the following differences: the first ray is not extinguished within the stigma, but crosses it without being discolored and reaches the margin; the rays running towards the apex and the posterior margin are very much narrower; the same applies to the last ray, which, moreover, is interrupted already in the discal cell, before reaching the fifth vein.

*Hab.* Texas (Belfrage).

## ANALYTICAL TABLE OF THE SMALLER GENERA,

ADOPTED FOR THE NORTH AMERICAN TRYPETÆ.

1	{	A picture on the wings is extant, but it is never reticulate.	2
		The picture is entirely or partly reticulate, sometimes altogether wanting. <sup>1</sup>	15
2	{	Scutellum with six bristles. <sup>2</sup>	I. HEXACHETA. 6
		Scutellum not with six bristles.	3
3	{	The third vein conspicuously curved forwards at the tip.	II. ACROTOXA. 4
		The third vein not curved forwards at the tip.	5
4	{	The picture of the wings is on the rivulet-pattern.	8
		The picture of the wings is not on the rivulet-pattern.	VI. STRAUSSIA. 6
5	{	Body elongate, abdomen narrower than thorax.	7
		Body short, abdomen as broad as thorax.	III. STENOPE. 7
6	{	Horizontal diameter of the eyes remarkably short.	IV. ACIDIA. 9
		Horizontal diameter of the eyes not shorter than usual.	V. EPOCHRA. 13
7	{	The antepenultimate section of the fourth vein straight.	10
		The antepenultimate section of the fourth vein curved.	11
8	{	Coloring of the body generally light, never black.	VII. SPILOGRAPHA. 12
		Coloring of the body black.	VIII. OEDICARENA. 12
9	{	Upon the middle of the wing there are two crossbands converging towards the posterior margin.	11
		No crossbands converging posteriorly upon the middle of the wing.	12
10	{	The third longitudinal vein is gently curved backwards towards the end; head not tumid.	12
		The third longitudinal vein is straight, up to its tip; head perceptibly swollen.	XI. TRYPTETA. 12
11	{	Wings with four very oblique crossbands and with very oblique approximate crossveins.	12
		Wings with crossbands which are rather perpendicular or dissolved in spots and with very steep crossveins.	12

<sup>1</sup> Among these species is *T. Lichtensteini*, the picture of which cannot well be called reticulate, but rather spotted.

<sup>2</sup> Compare also *Epochra*.

- 12 { Scutellum tumid, bituberculate. IX. PERONYMA.  
 { Scutellum of the ordinary structure, not swollen, although convex. X. PLAGIOTOMA.
- 13 { Crossveins conspicuously approximate, scutellum unusually swollen. XII. OEDASPIA.  
 { Crossveins not approximate, scutellum not swollen. 14
- 14 { Scutellum yellow, with four bristles, wings with black crossbands. XIII. RHAGOLETIS.  
 { Scutellum black, with two bristles, wings black, with hyaline indentations along the margin. XIV. ACIURA.
- 15 { Fifth vein strongly bristly; scutellum with six bristles. XV. BLEPHARONEURA.  
 { Fifth vein not bristly; scutellum with six or two bristles. 16
- 16 { Wings banded on the apex. XVI. ACROTOMIA.  
 { Wings not banded on the apex. 17
- 17 { Face spotted. 18  
 { Face not spotted. 19
- 18 { Wings very much dilated; pattern of the picture not radiating. XVII. EUTRETA.  
 { Wings not dilated; the pattern of the picture radiating along the margin (Tab. XI, f. 3). XVIII. CARPHOTRICHIA.
- 19 { Front remarkably broad. 20  
 { Front narrow, or of medium breadth. 21
- 20 { Third antennal joint short, rounded at the tip, ovipositor conical. XIX. EUCROSTA.  
 { Third antennal joint remarkably long, with a very sharp anterior angle, ovipositor flattened. XX. ACHDOGONA.
- 21 { Wings without picture, or on the apical half only, with a reticulation dissolved in crossbands. XXI. ASPILOTA.  
 { Wings neither without picture, nor, on the apical half, with a reticulation dissolved in bands. 22
- 22 { Wings of an evenly broad shape, and with an unusually blunt apex. (Tab. X, f. 18, and Tab. XI, f. 9.) XXII. ICTERICA.  
 { Wings of the usual shape or dilated. 23
- 23 { Flaps of the proboscis very much prolonged. XXIII. ENSINA.  
 { Flaps of the proboscis short, or but little prolonged. 24
- 24 { Pattern of the picture not radiating. XXIV. TEPHRETTIS.  
 { Pattern of the picture radiating. 25
- 25 { The whole or nearly the whole surface of the wings with a unicolorous reticulation. XXV. EUARETTA.  
 { A star-shaped black picture on the apex, the remaining surface immaculate, or with very few spots, at the utmost with a very faded reticulation. XXVI. URELLIA.

# DISTRIBUTION OF THE NORTH AMERICAN TRYPETÆ AMONG THE ADOPTED SMALLER GENERA.

## Gen. I. HEXACHÆTA.

1. *eximia* Wied.
2. *amabilis* nov. sp.

## Gen. II. ACROTOXA.

3. *suspensa* Lw.
4. *fraterculus* Wied.
5. *ludens* nov. sp.
6. *tricincta* nov. sp.

## Gen. III. STENOXA.

7. *vulnerata* nov. sp.

## Gen. IV. ACIDIA.

8. *fratria* Lw.
9. *suavis* Lw.

## Gen. V. EPOCHRA.

10. *canadensis* nov. sp.

## Gen. VI. STRAUSIA.

11. *longipennis* Wied.

## Gen. VII. SPILOGRAPHA.

12. *electa* Say.
13. *flavonotata* Macq.

## Gen. VIII. OEDICARENA.

14. *tetanops* nov. sp.

## Gen. IX. PERONYMA.

15. *sarcinata* Lw.

## Gen. X. PLAGIOTOMA.

16. *discolor* Lw.
17. *obliqua* Say.

## Gen. XI. TRYPTA.

18. *palposa* Lw.
19. *florescentis* Lin.

## Gen. XII. OEDASPIS.

20. *polita* Lw.
21. *atra* Lw.
22. *gibba* nov. sp.

## Gen. XIII. RHAGOLETIS.

23. *cingulata* Lw.
24. *tabellaria* Fitch.
25. *pomonella* Walsh.

## Gen. XIV. ACIURA.

26. *insecta* Lw.

## Gen. XV. BLEPHARONEURA.

27. *pocillogastra* nov. sp.

## Gen. XVI. ACROTÆNIA.

28. *testudinea* nov. sp.

## Gen. XVII. EUTRYTA.

29. *sparsa* Wied.
30. *rotundipennis* Lw.

## Gen. XVIII. CARPHOTRICHA.

31. *culta* Wied.

## Gen. XIX. EURHYTA.

32. *solidaginis* Fitch.
33. *comma* Wied.
34. *latifrons* Lw.

Gen. XX. *ACIDIGORA*.

- 35.
- melanura*
- nov. sp.

Gen. XXI. *ASPILOTA*.

- 36.
- alba*
- Lw.*
- 
- 37.
- albidipennis*
- Lw.*
- 
- 38.
- Vernoniae*
- Lw.*

Gen. XXII. *ICTERICA*.

- 39.
- seriata*
- Lw.*
- 
- 40.
- circinata*
- nov. sp.
- 
- 41.
- Lichtensteinii*
- Wied.*

Gen. XXIII. *ENSINA*.

- 42.
- humilis*
- Lw.*

Gen. XXIV. *TEPHRITIS*.

- 43.
- angustipennis*
- Lw.*
- 
- 44.
- finalis*
- Lw.*
- 
- 45.
- olathrata*
- Lw.*

- 46.
- geminata*
- Lw.*

- 47.
- fucata*
- Fbr.*

- 48.
- albiceps*
- nov. sp.

- 49.
- euryptera*
- nov. sp.

- 50.
- platyptera*
- nov. sp. ?

Gen. XXV. *EVARESTA*.

- 51.
- aequalis*
- Lw.*

- 52.
- festiva*
- Lw.*

- 53.
- bella*
- Lw.*

- 54.
- timida*
- Lw.*

- 55.
- melanogastra*
- Lw.*

- 56.
- mexicana*
- Wied.*

- 57.
- pura*
- nov. sp.

Gen. XXVI. *UMELLIA*.

- 58.
- abstersa*
- Lw.*

- 59.
- polyclona*
- nov. sp.

- 60.
- solaris*
- Lw.*

- 61.
- actinobola*
- nov. sp.



## COMPARISON BETWEEN THE EUROPEAN AND THE AMERICAN FAUNA OF TRYPETINA.

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INCOMPLETE as our knowledge of the North American Trypetina is, our scanty materials are, nevertheless, sufficient to enable us to form an approximate idea of their relation to the European fauna. Even a superficial comparison of a North American with a European collection of *Trypetæ* will show, that certain subgenera, characteristic for Europe by the number of species which represent them, are absolutely or almost wanting in America, while, on the contrary, North America possesses other, very peculiar forms, which do not occur in Europe.

We will notice, in the first place, that the subgenus *Urophora*, which, in Europe, embraces fully one-eighth of all the species, is not represented at all in North America.<sup>1</sup> Next to this, we become aware of the fact that the subgenus *Trypeta*, containing another eighth of all the European species, is represented in North America by *Trypeta palposa* only, besides *Trypeta florescentiæ* Lin., which is very probably imported from Europe.

As forms peculiar to North America and entirely foreign to the circles of relationship of the European *Trypetina*, the species of the subgenera *Hexachæta*, *Acrotoxa*, *Blepharoneura*, *Acrotænia*, *Eutreta*, and *Acidogona* deserve especial attention.

Besides these two very striking differences between the two faunas, a close comparison reveals other discrepancies; as, for instance, that less characteristic European subgenera are entirely wanting in North America, while subgenera occurring in North

---

<sup>1</sup> In South America likewise, no species of *Urophora* have as yet been found; all the South American species published by European authors as *Urophoræ* do not belong to this genus at all; most of them are not even *Trypetidæ*, but *Ortalidæ*, with black crossbands on the wings.

America, although wanting in Europe, are found to be closely related to European forms.

Subgenera with a small number of species, occurring in Europe and wanting in North America, are: 1. *Platyparea* (two species; the larva of the typical *Pl. pæcilopectera* lives in the stems of *Asparagus officinalis*); 2. *Euphranta* (one species, on *Asclepias* and *Vincetoxicum*); 3. *Hemilea* (one species); 4. *Hypenidium* (one species); 5. *Chælostoma* (one species, distinguished by the bristly sides of the face); 6. *Anomæa* (one species, in the fruits of *Cratægus*); 7. *Zonosema* (two species, related to *Rhagoletis*; in the fruits of *Rosa* and *Berberis*); 8. *Rhacochlæna* (one species); 9. *Myopites* (several, but as yet not well separated species; the larvæ live in the flowers of *Inula* and of the related genera); 10. *Sphenella* (one species; larvæ in the flowers of *Senecio*). If we accept the sufficiently well-founded division of the genus *Oedaspis*, in *Oedaspis* and *Orellia*, we have, moreover: 11. *Orellia* (three species; one on *Bryonia*, another on *Zizyphus*), to add to those small European subgenera, which have no representatives in North America.

The subgenera peculiar to North America, but allied to some European forms, are: the subgenera *Straussia* and *Oedicarena*, which resemble *Spilographa*; *Epochra* and *Stenopa*, which stand very close to *Acidia*; *Aspilota*, *Plagiotoma*, and *Peronyma*, which all approach *Trypeta*; *Icterica*, related to *Oxyphora*; and finally *Eurosta*, closely allied to some species of *Oxyna*.

Such are the differences between the two faunæ; I will now show the resemblances, as far as observed, between them.

The most striking coincidence and the most remarkable for the great number of analogous species, between the two faunas, occurs within the circle of relationship of the European species belonging to the subgenera: *Carphotricha*, *Oxyphora*, *Oxyna*, *Tephritis*, *Ensina*, *Urellia*. Another point of coincidence of the same kind, although less well represented as to the number of species, occurs within the closely related subgenera *Spilographa*, *Acidia*, and *Rhagoletis*. A third one may be noticed within the genus *Oedaspis*. Moreover, the North American species of the subgenera *Trypeta* and *Aciura*, a single one in each, are very much like European species of the same subgenera in their general appearance. Two species, common to both continents, have, until now, been ascertained: *Trypeta florescentiæ* (living on

*Sonchus*) and *Tephritis angustipennis* (occurring in Europe on *Achillea plarmica*). The specific identity of the American *Acidia fratria* and the European *Acidia heraclei* is not impossible, although as yet not certain.

It must be borne in mind, however, that all the comparative statements, given above, are founded upon a very imperfect knowledge of the North American fauna, and may be considerably modified with an increase of this knowledge.

If the European *Trypetina* be compared, not with those of the whole North American continent, but with the fauna occurring in America within the European latitudes, then some of the more striking differences between the two faunas at once disappear, as those subgenera which are absolutely foreign to Europe (*Hexachæta*, *Acrotoxa*, *Blepharoneura*, and *Acrotænia*) do not reach so far north. The occurrence of all four of these subgenera in Brazil proves that they are South American forms, which extend to the southern portions of the North American continent.

It was to be expected that the knowledge of the North American species should exercise an influence upon the subdivision of the old genus *Trypeta* in subgenera, a subdivision hitherto based almost exclusively upon European species. Those North American subgenera, which have no relationship whatever to European forms, of course merely increase the number of subgenera, without influencing in any manner the already existing subdivision. But it is different with those subgenera which contain forms common to both continents, and here the modifying influence of the American fauna becomes apparent. Thus we can already recognize: 1. That the definition of the subgenus *Carphotricha*, founded upon European species, has to be modified, in order to include all the species belonging to it; 2. That the genus *Oxyphora*, in its present acceptation, contains, besides a number of closely allied species, several far too aberrant forms; moreover, that it can no more be separated from the neighboring subgenera merely by the presence of bristles upon the third vein, a character which hitherto has been found sufficient for the distinction of the European species; 3. That the subgenus *Ensina* must be taken in a broader sense than has been done in my Monograph of the European *Trypetæ*, especially through the addition of some species which, in the same Monograph, were placed in *Oxyina*; 4. That the remaining portion of *Oxyina*

must be united generically with the subgenus *Tephritis*, or else that it should be separated from it in some other manner than has been hitherto done; and that, in order to facilitate the identification of species, a new genus, closely allied to the two above named ones, should be founded, for which I have already proposed the name of *Euaresta*.

I reserve for another place to carry out in detail the improvements of the system of *Trypetina* of which I have here given the outline, and I intend, at the same time, to take in consideration the known species from all the other continents.

## APPENDIX I.

### CRITICAL ENUMERATION OF ALL THE NORTH AMERICAN TRYPETINA DESCRIBED BY OTHER AUTHORS.

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1. *aoidusa* Walk. very probably belongs to the subgenus *Acrotoxa*; what Mr. Walker says of the curvature of the end of the third longitudinal vein is evidently to be referred to the fourth vein, and the same remark applies to *Trypeta Ethalea* Walker, from Para, which follows upon the former in the text.
2. *acutangula* Thoms., unknown to me; probably belongs to the subgenus *Tephritis*.
3. *ænea* v. d. Wulp (Tijdschr. voor Ent. 2 Ser. II, p. 157), described as *T. (Aciura) ænea*; does not belong to the *Trypetidæ* at all, but to the *Ortalidæ*, and is synonymous with *Chatopsis ænea* Wied.
4. *albiscutellata* Harr. has never been described, and, hence, is to be stricken out.
5. *antillarum* Macq., described by Macquart as *Urophora* does neither belong to this genus nor to the *Trypetidæ* in general, but to the *Ortalidæ*; figure and description agree so little that the identification will be difficult.
6. *arouata* Walk. is synonymous with *Tritoza flexa* Wied. (*Ortalidæ*).
7. *armata* R. Desv., published as a *Strauzia*; this is the male of *T. (Straussia) longipennis* Wied.
8. *asteris* Harris is identical with *T. (Eurosta) solidaginis* Fitch, as Baron Osten-Sacken has shown; the choice of the name depended on an erroneous assumption as to the plant on which the larva lives.
9. *aurifera* Thom., a species unknown to me, belonging to the subgenus *Ensina*.
10. *avala* Walk.; the very insufficient data given by the author do not even enable me to decide whether this is a *Trypetida* or an *Ortalida*; even the location of the species in the genus *Urophora* does not help through this dilemma, because *Myennis fasciata* Fab. is placed in the same genus, thus proving that Mr. Walker was not cognizant at all of the characters of this genus.
11. *Beauvoisii* R. Desv., described as *Prionella Beauvoisii*; unknown to me, so far that I am unable to decide whether it is a *Trypetida* or

- an *Ortalida*; the former, however, seems more probable. Its occurrence in America is uncertain, and is only supposed by R. Desvoidy, because the described specimen belonged to *Palisot de Beauvois* collection.
12. *caliptera* Say is synonymous with *T. (Eutreta) sparsa* Wied.
  13. *cinotipes* Harris is to be stricken out, as undescribed.
  14. *comma* Wied.; an *Eurosta*, has been described in this volume.
  15. *cornigera* Walk., an unimportant variety of the male of *T. longipennis* Wied.
  16. *cornifera* Walk., same remark as the preceding.
  17. *cribrata* v. d. Wulp (l. c. p 168), syn. with *T. (Eurosta) latifrons* Lw.
  18. *culta* Wied., a *Carphotricha*, described above.
  19. *dinia* Walk. In the Monographs, Vol. I, I expressed the supposition that it may belong to the relationship of *T. (Aciura) tibialis*; but in doing it, I paid too little attention to the coloring of the body. I think it more probable now that this is a species closely allied to *T. (Hexacheta) eximia* Wied., perhaps even only a badly described variety of this very species.
  20. *electa* Say, a *Spilographa*; has been described in Monographs, Vol. I.
  21. *eximia* Wied., a *Hexacheta*, described above; known long ago as a Brazilian species; its occurrence in Mexico has been discovered recently.
  22. *fasciventris* Macq., synonymous with *T. (Hexacheta) eximia* Wied.
  23. *femoralls* Thoms., an unknown *Urellia* from the group with two bristles on the scutellum.
  24. *fimbriata* Macq. is the same as *T. (Carphotricha) culta* Wied.
  25. *flavonotata* Macq., a species closely allied to *T. (Spilographa) electa* Say, but not a mere variety of this species, as I formerly supposed. It is described in this volume.
  26. *flexa* Wied. is a *Tritoza* (*Ortalida*).
  27. *fraterculus* Wied., described by Wiedemann as *Dacus fraterculus*, after a specimen from Brazil; occurs likewise in Peru, New Granada, and Cuba. Belongs in the genus *Acrotoxa*, and is the same as *Trypeta unicolor* Lw., Monographs, Vol. I. Wiedemann's description did not enable me to recognize this identity, which I have, however, found out since, by comparing the original specimen. As a matter of course, Wiedemann's name has to be maintained.
  28. *fucata* Fabr. may be referred to *Tephritis*, and has been described above.
  29. *fulvifrons* Macq. is *Chaetopsis aenea* Wied. (*Ortalidæ*).
  30. *genalis* Thoms., from California; unknown to me; probably a *Tephritis*.
  31. *inermis* R. Desv., published as a *Strauzia*, is *T. (Straussia) longipennis* female.

32. *interrupta* Macq., described as *Urophora*, is not a *Trypetida* at all, but a *Rivellia* of difficult identification.
33. *latipennis* Macq., published as a *Platystoma*, is most certainly a *Trypetida*, in which I cannot recognize anything else but *T. (Eutreta) sparsa*.
34. *Lichtensteinii* Wied., described above after the types of Wiedemann's work, and provisionally placed in the genus *Ictericia*, from the typical species of which, however, it is somewhat different.
35. *Hogaster* Thoms. is the same as *T. (Acidia) fratria* Lw.
36. *longipennis* Wied. is the typical species of the genus *Straussia*, and, as it seems, undergoes considerable variations. In Monographs, Vol. I, I have given a description of this species, and in the present volume have enumerated the varieties which I have had occasion to see, some of which, however, may be distinct species.
37. *marginepunctata* Macq., almost certainly a *Trypetida*, but which it would be premature to identify with *T. (Carphotricha) culta* Wied. Macquart's data are so very insufficient that the identification will be very difficult.
38. *melliginis* Fitch is a *Rivellia*, under which head it has been discussed.
39. *mevarna* Walk., an *Urellia*, unknown to me.
40. *mexicana* Wied., an *Euresta*; the above description has been prepared from Wiedemann's typical specimen.
41. *narytia* Walk.; the remarks appended above to *avala* Walk. may be repeated here.
42. *novæboracensis* Fitch is synonymous with *T. (Eutreta) sparsa* Wied.
43. *nigriventris* Macq., erroneously described as *Urophora*; it is a *Trypetida*, which I do not know, and concerning the systematic position of which I am in doubt.
44. *obliqua* Macq. is an *Acrotoza*; I do not know it.
45. *obliqua* Say is the type of the subgenus *Plagiotoma*; is described in Monographs, Vol. I.
46. *oorea* Walk. belongs to the subgenus *Acrotoza*; I am unable to identify it among the species known to me.
47. *picciola* Bigot (R. de la Sagra, Hist. fis. Cub. Tab. XX, f. 10). This species, described as *Acinia*, is the same as *T. (Ensina) humilis* Lw.
48. *picta* Fabr., type of the genus *Camptoneura* (*Ortalida*).
49. *pomonella* Walsh, subgenus *Rhagoletis*, is described in this volume.
50. *quadrifasciata* Macq. I suppose that this species will be found to be identical with *T. (Peronyma) sarcinata* Lw.
51. *quadrivittata* Macq. is an *Ortalida*.
52. *scutellaris* Wied. is an *Ortalida*.
53. *scutellata* Wied. is a *Trypeta* the position of which cannot be made out of Wiedemann's description; Wiedemann's typical specimen unfortunately is no more in existence.
54. *septenaria* Harris is to be stricken out, as undescribed.

55. *solidaginis* Fitch, an *Eurosta*, sufficiently described in Monographs, Vol. I.  
 56. *sparsa* Wied.; described in Monographs, Vol. I; typical species of the genus *Eutreta*.  
 57. *tabellaria* Fitch; described as a *Tephritis*. In Monographs, Vol. I, I have expressed the erroneous supposition that this species belongs to the *Ortalidæ*. It is a *Trypetida* of the subgenus *Rhagoletis*, and has been described in the present volume.  
 58. *tribullis* Harris is not described, and hence must be stricken out.  
 59. *trimaculata* Macq. is *T. (Straussia) longipennis* Wied.  
 60. *trifasciata* Harris; not described.  
 61. *villosa* R. Desv.; described as *Prionella*; the remark appended above to *Prionella Beauvoisii* may be repeated here.

The result of the above remarks may be summed up as follows:—

1. Five of the above-quoted species named by Mr. Harris must be stricken out, as their descriptions have never been published:—

*albiscutellata* Harris.  
*cinctipes* Harris.  
*septenaria* Harris.

*tribullis* Harris.  
*trifasciata* Harris.

2. Ten species must be transferred to the *Ortalidæ*:—

*senea* v. d. Wulp.  
*antillarum* Macq.  
*arouata* Walk.  
*flexa* Wied.  
*fulvifrons* Macq.

*interrupta* Macq.  
*melliginis* Fitch.  
*picta* Fabr.  
*quadrivittata* Macq.  
*scutellaris* Wied.

3. Fifteen species are merely synonyms of other *Trypetidæ*; the two marked with an interrogation are not as certain as the others:—

*armata* R. Desv. = *longipennis* Wied.  
*asteris* Harr. = *solidaginis* Fitch.  
*caliptera* Say = *sparsa* Wied.  
*cornigera* Walk. = *longipennis* Wied.  
*cornifera* Walk. = *longipennis* Wied.  
*cribrata* v. d. Wulp = *latifrons* Lw.  
*fascioventris* Macq. = *eximia* Wied.



*limbrata* Macq. = *culta* Wied.  
*?liogaster* Thoms. = *fratria* Lw.  
*inermis* R. Desv. = *longipennis* Wied.  
*latipennis* Macq. = *sparsa* Wied.  
*novæboracensis* Fitch = *sparsa* Wied.  
*plioclola* Bigot = *humilis* Lw.  
*trimaculata* Macq. = *longipennis* Wied.  
*?quadrifasciata* Macq. = *sarcinata* Lw.

4. *Fifteen* species are recognized by me and described in detail in Monographs, Vol. I, and in the present work:—

<i>comma</i> Wied.	<i>longipennis</i> Wied.
<i>culta</i> Wied.	<i>mexicana</i> Wied.
<i>electa</i> Say.	<i>obliqua</i> Say.
<i>eximia</i> Wied.	<i>pomonella</i> Walsh.
<i>flavomaculata</i> Macq.	<i>solidaginis</i> Fitch.
<i>fraterculus</i> Wied.	<i>sparsa</i> Wied.
<i>fucata</i> Fabr.	<i>tabellaria</i> Fitch.
<i>Lichtensteinii</i> Wied.	

5. *Sixteen* species consequently remain, which I have never seen or have not been able to identify; most of them are undoubtedly *Trypetidæ*; the doubtful ones I have marked with an interrogation:—

<i>acidusa</i> Walk.	<i>marginepunctata</i> Macq.
<i>acutangula</i> Thoms.	<i>mevarna</i> Walk.
<i>aurifera</i> Thoms.	<i>?narytia</i> Walk.
<i>?avala</i> Walk.	<i>nigriventris</i> Macq.
<i>?Beauvoisii</i> R. Desv.	<i>obliqua</i> Macq.
<i>Dinia</i> Walk.	<i>oocresia</i> Walk.
<i>femorialis</i> Thoms.	<i>scutellata</i> Wied.
<i>genalis</i> Thoms.	<i>?villosa</i> R. Desv.

## APPENDIX II.

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THE descriptions of North American species of *Trypeta*, published by previous authors, but not identified in the foregoing Monograph, are reprinted *verbatim* in the Monographs, etc., Vol. I, p. 94. The following five Californian species of Mr. Thomson, were published since the issue of that volume (*T. liogaster* Thoms. is left among them, as its synonymy with *T. fratria* Lw. is not quite certain).

*Thomson, Eugenes Resa, etc., Zoologi, VI, p. 578.*

### Genus **TRYPETA.**

A. Alæ cubiti ramo submarginali setuloso, cellula anali postice angulo infero breviter sed acute producta, abscissa costali 2a spinula fere nulla. Frons serie laterali 5-setosa. Thorax setarum dorsallium pari pone medio sito. Scutellum 4-setosum. Proboscis brevis.

**251. *Trypeta liogaster.***—Ferruginea nitida, abdomine glabro; alis albis, fusco-flexuoso-variegatis; postscutello macula magna didyma nigra. ♀. Long. 5 mill.

*Patria.* California.

*T. Onopordi* colore et alarum pictura simillima, abdomine glabro mox distincta. Caput rotundum, fere globosum, ferrugineum, occipite haud excavato; fronte subopaca, subtilissime puberula, serie laterali 5-setosa, setis 2 posterioribus magis ab oculis remotis; epistomate haud brevi, foveis antennalibus minus determinatis, divergentibus, genis angustis, inferne paullo latioribus; peristomio magno, rotundo, utrinque medio seta una validiore nigra instructo, proboscide brevi, capitulo crasso; oculis nudis, fere ovalibus, inferne sat longe descendentibus, orbita frontali parallela, faciali minus divergente. Antennæ subdeflexæ, basi vix distantes, articulo 3o ovali, apice haud mucronato,

epistomatis apicem haud attingente, seta nuda. Thorax ferrugineus, nitidus, glaber, setarum dorsalium pari pone medium sito; scutellum subtriangulare, 4-setosum, postscutello macula magna nigra nitida utrinque ornato. Alæ longæ, margine infero vix sinuato, albo-brunneoque flexuoso-variegatæ, macula nempe oblongo-quadrata cellulam totam mediastinam fere occupante alteraque costali triangulari ad cubiti ramum submarginalem usque descendente, pone postcostæ exitum sita, cum maculis duabus disci sinubusque profundis marginis inferioris ante apicem albis, basi inferne late albida; nervis costali abscissa 2a spinula fere nulla, 3a 2a haud duplo brevior, 5a sextæ fere æquali; mediastino apice sub angulo recto costam versus abscedente ibidemque obsoleto; postcostali toto dense setuloso, medium alæ vix attingente; cubiti furca sat longe ante apicem cellulæ humeralis sita, ramo submarginali parce vix ultra nervum transversum ordinarium setuloso, postice lenissimo curvato et brachiali plane parallelo; humerali mox pone nervum transversum discoidalem desinente; cellula discoidali postice recta truncata nervum transversum ordinarium perpendicularem, longe pone postcostæ exitum situm, in sua tertia posteriore parte excipiente; anali inferne haud longe, sed acute producta, quam humerali brevior. Abdomen ovali-rotundum, supra leviter convexum, glabrum, nitidum, segmento 5o margine postico utrinque setis 4 ornato, 6o parvo fere triangulari, apice truncato, brunneo-nigro, terebram includente. Pedes haud validi, coxis anticis medium mesosterni vix attingentibus; femoribus anticis subtus setosis; tibiis intermediis apice calcari nigro armatis; mesosternum, ut in omnibus, seta in angulo posteriore instructum; epimeris etiam sub alis seta nigra præditis.

**B. Alæ ramo cubiti submarginali nudo.**

- aa. Alæ cellula discoidali postice quam nervi transversi ordinarii longitudine vix latiore.
- b. Proboscide haud hamato-reflexa.
- cc. Alæ cellula discoidali angulo infero recto.
- dd. Alæ minus angustæ, cellulis brachiali et humerali haud brevibus, nervo transverso discoidali margine infero alæ approximato, abscissa costali 5a 6a haud duplo longiore.
- ee. Alæ albidæ vel hyalinæ, fusco-maculatæ, vel reticulatæ.
- f. Scutellum bisetosum. Alæ angulo inferiore cellulæ analis recto. Thorax setarum dorsalium pari ante medium sito. Femora plerumque tenuia, antica setis 3-4 subtus ornata.
- gg. Cellula postcostali nigra vel nigro-fusca.

**258. *Trypeta femoralis*.**—Nigro-fusca, glauco-pruinosa, capite cum antennis pedibusque flavis, femoribus intermediis subtus setulis 4-5 munitis; alis albidis, macula posteriore fusca apicem versus nullum ramum sed inferne ramum integrum nervum transverso-discoidalem transeuntem emittente, cum cellula postcostali per plagam obliquam connexa. ♂. Long. 4 mill.

*Patria.* California.

Præcedentibus<sup>1</sup> similis et affinis, femoribus intermediis subtus setis 4-5 validioribus munitis, alis macula posteriore nigro-fusca guttulas 3 majores includente, ramum apicalem nullum sed inferne ramulos 2 abbreviatos ante ramum nervum transverso-discoidalem transeuntem emittente, ramis 2 posterioribus basi tantum indicatis, nervo humerali longitudinaliter ultra medium infusato distincta.

*ff.* Scutellum 4-setosum. Alæ angulo inferiore postico cellulæ analis acute subproducto.

**261. *Trypeta acutangula*.** Nigricans, cano-pruinosa, capite, scutelli apice pedibusque flavis; alis parce fusco-reticulatis, macula majore nigricante, fusco-radiata, cellula postcostali flavescenti. ♂. Long. 4 mill.

*Patria.* California.

Alis pictura fere *T. cometa*, sed disco et antice parce fusco-reticulatis, cellula postcostali fere tota flavescenti, serie frontali 5-setosa mox distincta. Caput thoracis latitudine, flavo-testaceum, occipite superne fusco, fere truncato; fronte fere transversa, serie utrinque 5-setosa; epistomate brevi, foveis antennalibus fere parallelis, sat discretis; peristomio subrotundo, proboscide haud geniculata; oculis sat magnis, inferne sat longe descendentibus, orbita frontali antrorsum fere convergente. Antennæ breves, subdeflexæ, articulo 3o ovali-rotundo, epistomatis apicem fere attingente, nigro-fusco, seta nudiuscula. Thorax cano-pruinosis, setarum dorsalium pari pone suturam transversam sito; scutello apice late testaceo, 4-setoso, setis apicalibus minoribus approximatis. Alæ sat latæ, obscure hyalinæ, parcius, disco medio evidentius, fusco-reticulatæ, macula posteriore nigricante, subrotunda, guttas 2 costales includente, quarum posteriore paullo

<sup>1</sup> The two preceding species are: *T. glauca* from Sidney, which the author calls "*T. solari* Loew similis et affinis," and *T. meteorica* from Buenos Ayres, described as "præcedenti simillima." O. S.

ante rami marginalis exitum sita, apicem versus ramum bifurcatum, inferne ramos 3 angustos integros fuscus emittente; fuscedine nervi transversi ordinarii sat lata, postice guttis 2 majusculis a macula posteriore magna sejuncta, per strigam obliquam cum cellula postcostali flavescenti connexa et in cellulam discoidalem lobum triangularem emittente; cellula marginali postice guttis 2 magnis albidis, linea transversa fusca separatis ornata; nervis costali abscissa 2a spinula distincta armata, 5a 6a plus quam sesqui longiore; postcostali medium alæ attingente; cubiti ramo submarginali postice cum brachio plane parallelo, hoc pone nervum transverso-discoidalem lenissime curvato; cellula discoidali nervum transversum ordinarium, sat longe pone postcostæ exitum, nonnihil pone medium alæ situm, in sua 5a posteriore parte excipiente; anali angulo inferno postico acute subproducto. Abdomen unicolor, nigricans, cano-puberulum et pilis depressis parvis rigidis pallidis vestitum, segmento 4o præcedente plus quam duplo longiore. Pedes toti flavi, femoribus haud validis, anticis subtus setulis 3-4 flavidis longioribus et basi nonnullis brevioribus ornatis.

bb. Proboscide hamato-reflexa. Epistomate brevi, inferne prominente; peristomio antice exciso-assurgente. Palpis prominulis.

AA. Alæ fascia recta nervum transversum ordinarium transeunte haud ornata sed fusco reticulata.

i. Scutellum 4-setosum.

**264. *Trypeta aurifera*.**—Nigricans, capite cum antennis pedibusque testaceis, femoribus ultra medium nigris; alis subhyalinis, obsolete fusco-reticulatis, macula costali quadrata pone spinulam sita, determinate nigricante. ♂ ♀. Long. 3-4 mill.

*Patria.* California.

*T. elongatulæ* simillima, femoribus ultra medium nigro-fuscis, alis adhuc obsolete fusco-reticulatis, cellula postcostali nigro-fusca, guttam albidam haud includente mox distincta. Caput haud transversum, thoracis latitudine, testaceum, occipite fusco, inferne tumido; fronte subdeclivi, latitudine sua dimidio longiore, utrinque albida 4-setosa, scuto ocelligero nigro-fusco; epistomate brevi, verticali, genis inferne haud latis, superne angustis; peristomio oblongo, antice angulato-exciso, proboscide elongata, geniculata, capitulo longissimo, tenui; oculis magnis obliquis. Antennæ basi contiguæ, testacæ, breves, epistomatis apicem

attingentes, articulo 3o breviter ovali, seta nuda. Thorax nigricans, cano-pruinosus et pube brevi rigida pallida vestitus, setarum dorsalium pari mox pone suturam sito; scutellum 4-setosum, setis apicalibus parvis. Alæ subhyalinæ, obsolete fusco-reticulatæ, macula quadrata pone spinulam nigricante, determinata: nervis costali abscissa 2a spinula munita, 5a 6a paullo longiore; postcostali medium alæ haud attingente; brachiali et ramo submarginali cubiti parallelis; cellula discoidali nervum transversum ordinarium, longe pone postcostæ exitum paullo pone medium alæ situm, in sua 4a posteriore parte excipiente; anali angulo infero acuto. Abdomen subdepressum, pruinosum et pube rigida pallida vestitum, segmentis 4o et 5o apice setulis nonnullis marginatis, 6o depresso, nitido, glabro, 2 præcedentibus simul sumptis longitudine æquali. Pedes haud validi, femoribus anticis subtus setis 2-3 ornatis, omnibus nigris, apice cum tibiis tarsisque testaceis.

**265. *Trypeta genalis*.**—Nigricans, capite pedibusque flavis, femoribus ultra medium nigris; alis hyalinis, fusco-reticulatis, striga obliqua pone spinulam apiceque magis fuscis; abdomine bifariam fusco-maculato, terebra brevi depressa. ♂ ♀. Long. 3-4 mill.

*Patria.* California.

*T. tessellate* Loew, simillima genis superne angustioribus; alis obscure hyalinis, guttis minoribus, disco interiore basali magis fusco-reticulato distincta; a præcedente capituli labiis brevioribus, alis evidentius fusco-reticulatis discedens. Caput ut in præcedente, fronte paullo latiore, epistomate parum prominulo, proboscide capitulo minus elongato. Thorax et scutellum ut in præcedente constructa. Alæ subhyalinæ, fusco-reticulatæ, striga nigro-fusca pone spinulam guttam albam costalem includente, oblique nervum transversum ordinarium transeunte, apice fusco, guttis pluribus majoribus albidis, quarum 5 arcum ante apicem formantibus ornato; nervis omnino ut in præcedente directis, sed postcostali medium alæ attingente, transverso ordinario paullo pone postcostæ exitum sito. Abdomen bifariam fusco-maculatum, pilis brevibus rigidis albidis in margine apicali segmentorum evidentioribus vestitum. Pedes ut in præcedente, sed femoribus anticis subtus setis 4-5 ornatis.

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         *polyclona* Lw., 324  
         *solaris* Lw., 325
- Urophora*, 331  
     *Urophora antillarum* Macq., 335  
         *bivittata* Macq., 231  
         *interrupta*, 337  
         *nigriventris* Macq., 337  
         *scutellaris* Macq., 267  
         *vittithorax* Macq., 227
- Zonosema*, 245, 332



## EXPLANATION OF THE PLATES.

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### ORTALIDÆ.

#### PLATE VIII.

1. *Amphicnephes pertusus* nov. sp.
2. *Himeroessa pretiosa* nov. sp.
3. *Rivellia conjuncta* nov. sp.
4. *Rivellia viridulans* Rob. Desv.
5. *Rivellia quadrifasciata* Macq.
6. *Rivellia variabilis* nov. sp.
7. *Rivellia flavimana* nov. sp.
8. *Rivellia pallida* nov. sp.
9. *Myrmecomylia myrmecoides* Lw.
10. *Tritoxa flexa* Wied.
11. *Tritoxa cuneata* nov. sp.
12. *Tritoxa incurva* nov. sp.
13. *Camptoneura picta* Fbr.
14. *Diacrita costalis* Gerst.
15. *Diacrita æmula* nov. sp.
16. *Idana marginata* Say.
17. *Tetanops luridipennis* nov. sp.
18. *Tetanops integer* nov. sp.
19. *Anacampta latiuscula* nov. sp.
20. *Ceroxys obscuricornis* nov. sp.
21. *Ceroxys ochricornis* nov. sp.
22. *Ceroxys canus* Lw.
23. *Ceroxys similis* nov. sp.
24. *Tephronota humilis* nov. sp.
25. *Stictocephala cribrum* nov. sp.

- 26. Stictocephala cribellum** nov. sp.
- 27. Callopietria annulipes** Macq.
- 28. Stictocephala corticalis** Fitch.
- 29. Stictocephala vau** Say.
- 30. Pterocalla strigula** nov. sp.

## PLATE IX.

- 1. Oedopa capito** Lw.
- 2. Oedopa capito** Lw.
- 3. Oedopa capito** Lw.
- 4. Euphara cærulea** Macq.
- 5. Notogramma stigma** Fbr
- 6. Scoptera colon** Lw.
- 7. Euxesta spoliata** Lw.
- 8. Euxesta pusio** Lw.
- 9. Euxesta notata** Wied.
- 10. Euxesta costalis** Fbr.
- 11. Euxesta quaternaria** Lw.
- 12. Euxesta binotata** Lw.
- 13. Euxesta annonæ** Fbr.
- 14. Euxesta Thomæ** Lw.
- 15. Euxesta abdominalis** Lw.
- 16. Euxesta alternans** Lw.
- 17. Euxesta stigmatias** Lw.
- 18. Euxesta eluta** Lw.
- 19. Chætopsis senea** Wied.
- 20. Chætopsis debilis** Lw.
- 21. Stenomyia tenuis** Lw.
- 22. Eumetopia rufipes** Macq.
- 23. Eumetopia varipes** Lw.
- 24. Epiplatea erosa** Lw.
- 25. Stenomacra Guerinii** Bigot.
- 26. Idiotypa appendiculata** nov. sp.
- 27. Cœlometopia bimaculata** nov. sp.
- 28. Hemixantha spinipes** nov. sp.
- 29. Melanostoma afinis** nov. sp.

## TRYPETIDÆ.

## PLATE X.

## TRYPETA.

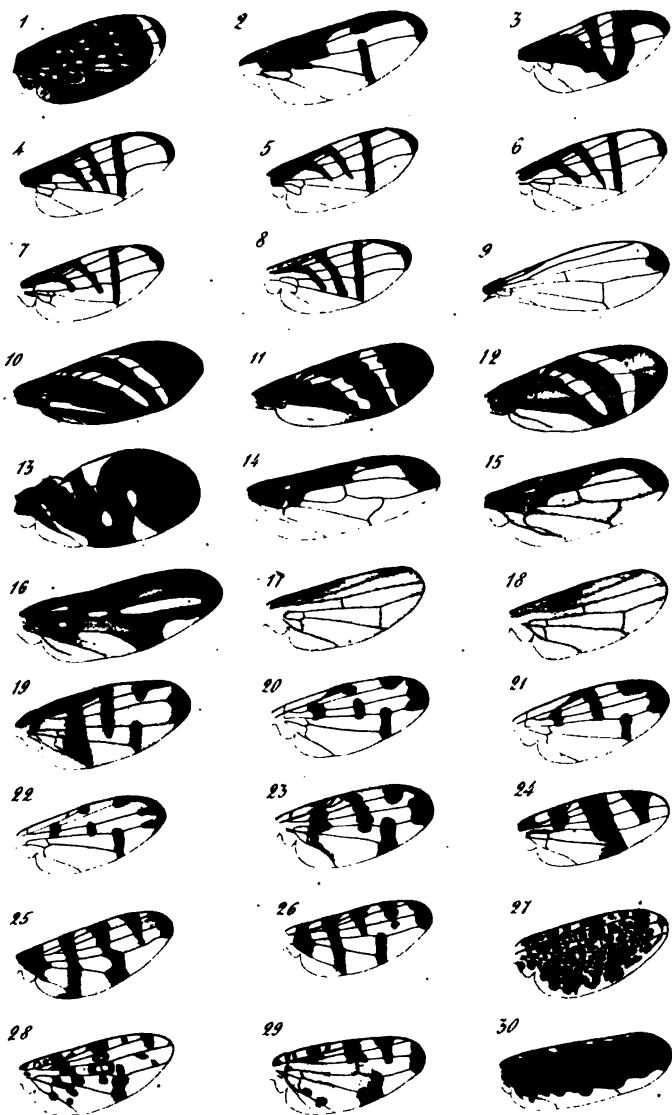
- |                                 |                                    |
|---------------------------------|------------------------------------|
| 1. <i>discolor</i> Lw.          | 16. <i>solidaginis</i> Fitch.      |
| 2. <i>longipennis</i> Wied., ♂. | 17. <i>humilis</i> Lw.             |
| 3. <i>longipennis</i> Wied., ♀. | 18. <i>seriata</i> Lw.             |
| 4. <i>fratria</i> Lw.           | 19. <i>solaris</i> Lw.             |
| 5. <i>suspensa</i> Lw.          | 20. <i>æqualis</i> Lw.             |
| 6. <i>fraterculus</i> Wied.     | 21. <i>festiva</i> Lw.             |
| 7. <i>electa</i> Say.           | 22. <i>latifrons</i> Lw.           |
| 8. <i>insecta</i> Lw.           | 23. <i>bella</i> Lw.               |
| 9. <i>palposa</i> Lw.           | 24. <i>melanogastra</i> Lw., ♀.    |
| 10. <i>suavis</i> Lw.           | 25. <i>timida</i> Lw.              |
| 11. <i>cingulata</i> Lw.        | 26. <i>obscuriventris</i> nov. sp. |
| 12. <i>polita</i> Lw.           | 27. <i>spectabilis</i> nov. sp.    |
| 13. <i>sparsa</i> Wied.         | 28. <i>mexicana</i> Wied.          |
| 14. <i>rotundipennis</i> L.     | 29. <i>tenuis</i> nov. sp.         |
| 15. <i>clathrata</i> Lw.        | 30. <i>peregrina</i> nov. sp.      |

## PLATE XI.

## TRYPETA.

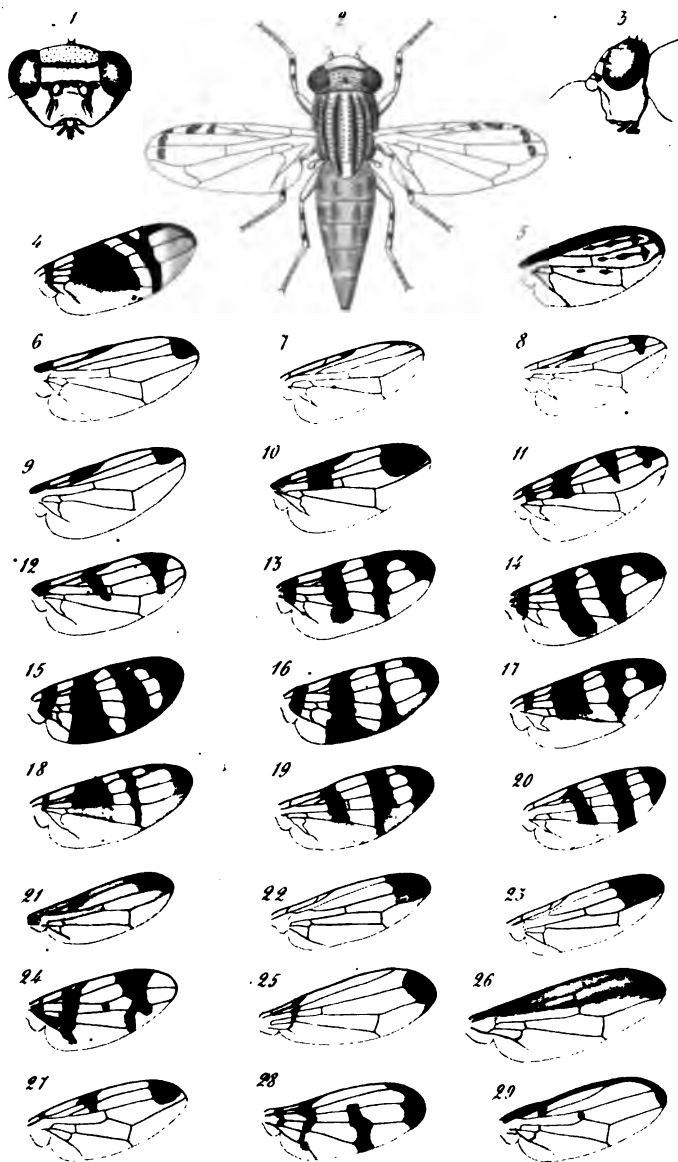
- |                                 |                                     |
|---------------------------------|-------------------------------------|
| 1. <i>geminata</i> Lw.          | 15. <i>tetanops</i> nov. sp.        |
| 2. <i>comma</i> Wied.           | 16. <i>sarcinata</i> Lw.            |
| 3. <i>culta</i> Wied.           | 17. <i>atra</i> Lw.                 |
| 4. <i>finalis</i> Lw.           | 18. <i>nigerrima</i> Lw.            |
| 5. <i>albiceps</i> nov. sp., ♂. | 19. <i>ludens</i> nov. sp.          |
| 6. <i>melanura</i> nov. sp.     | 20. <i>parallela</i> Wied.          |
| 7. <i>abstersa</i> Lw.          | 21. <i>consobrina</i> nov. sp.      |
| 8. <i>Vernoniæ</i> Lw.          | 22. <i>hamata</i> nov. sp.          |
| 9. <i>Lichtensteini</i> Wied.   | 23. <i>integra</i> nov. sp.         |
| 10. <i>albidipennis</i> Lw.     | 24. <i>pseudoparallela</i> nov. sp. |
| 11. <i>alba</i> Lw.             | 25. <i>serpentina</i> Wied.         |
| 12. <i>phœnicura</i> nov. sp.   | 26. <i>grandis</i> Macq.            |
| 13. <i>testudinea</i> nov. sp.  | 27. <i>bivittata</i> Macq.          |
| 14. <i>obliqua</i> Say.         |                                     |



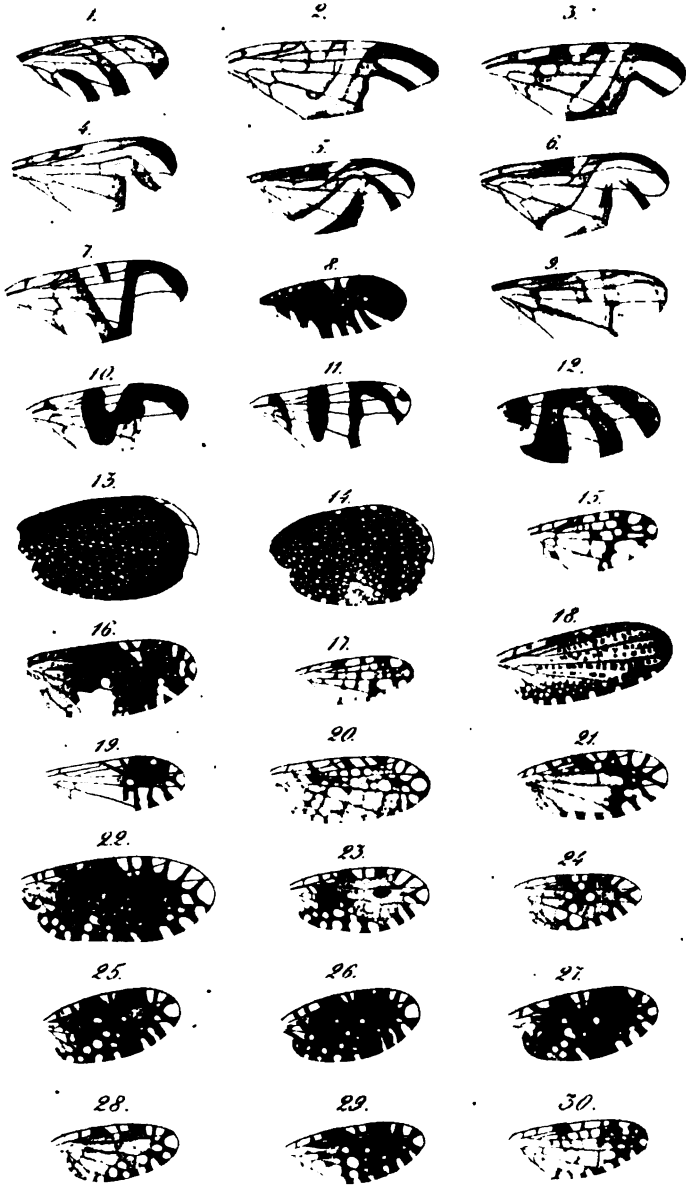


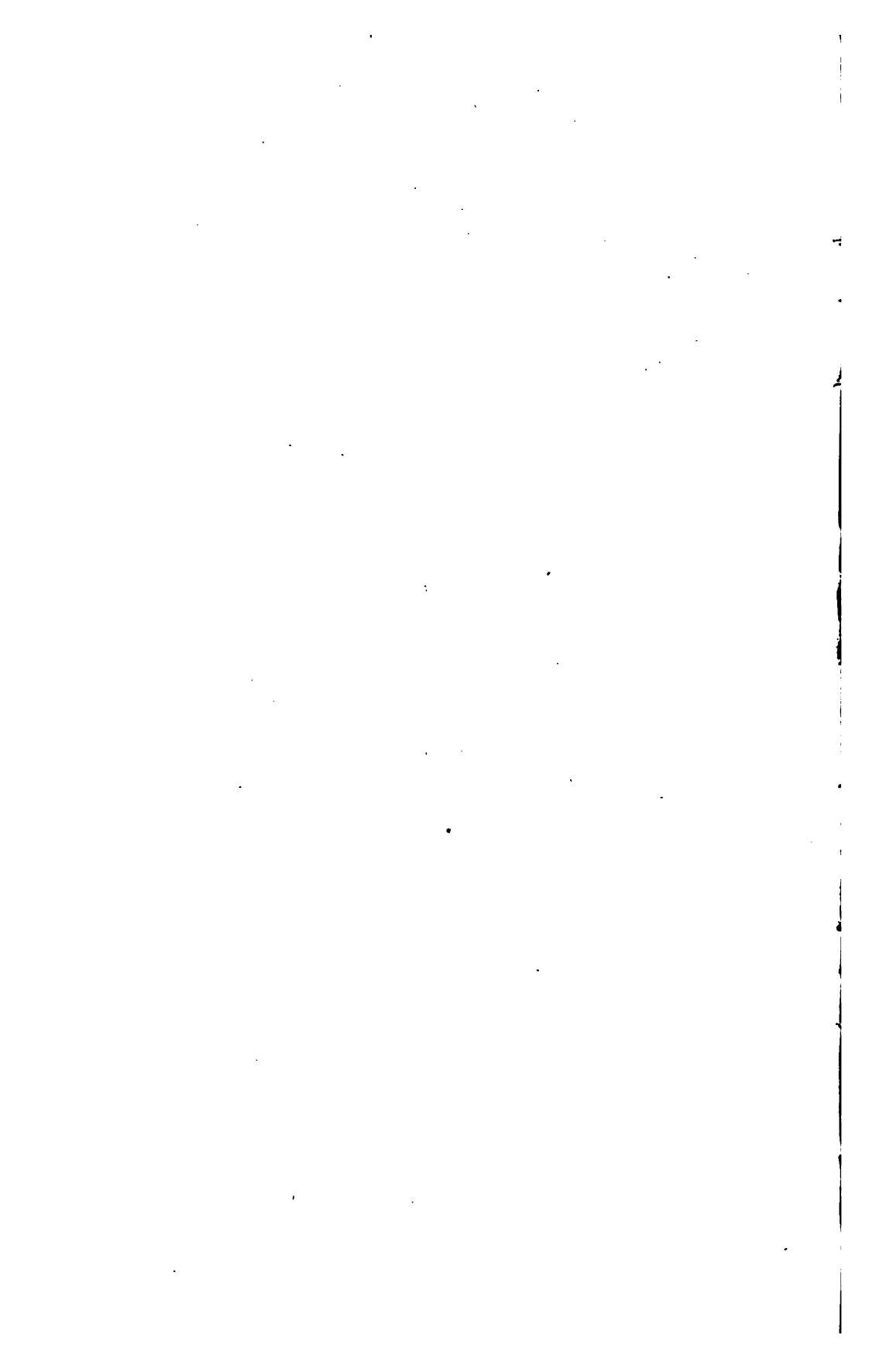


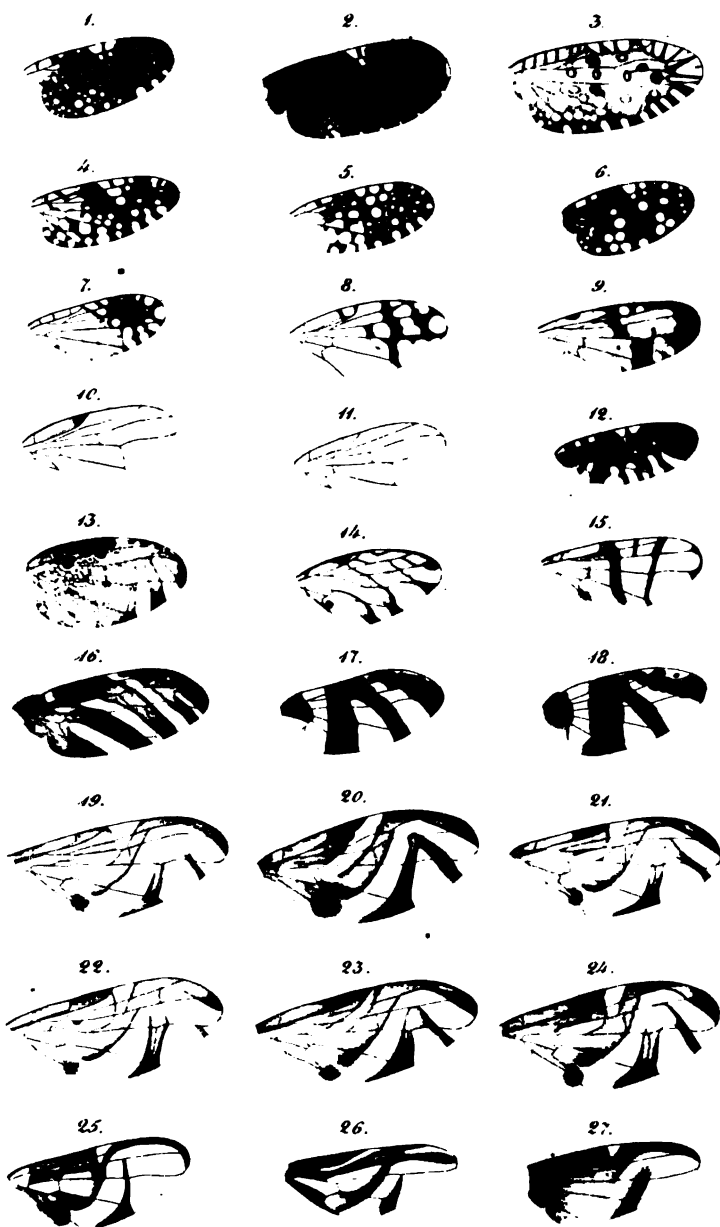














### CORRECTIONS TO VOLUME III.

Page 283, as a synonym of *T. latifrons* insert:—

*Trypeta cribrata* v. D. WULF, Tijdschr. v. Entom. 2 Ser. Vol. II, p. 158.  
Tab. V, f. 15.

*Observation* (by the Editor) to page 153.—This volume was already printed when I received from Mr. E. Burgess specimens taken near Beverly, Mass., and showing the characters of *Scopula vibrans* Lin., as distinguished from *S. colon* Loew. Immediately afterwards I found in the Museum of Comparative Zoölogy a precisely similar specimen, apparently taken near Cambridge, Mass.—O. S.





ADDITIONS AND CORRECTIONS  
TO THE PREVIOUSLY PUBLISHED VOLUME.

---

*Corrections to Volumes I and II, furnished by Mr. Laew.*

VOLUME I.

- Page 10, line 3 from bottom, instead of *Cylindrotoma Meig.* read *Macq.*  
" 17, " 15 from top, instead of *wing*, read *margin of the wing.*  
" 17, " 14 from bottom, *Metoponia (=Inopus)*, strike out *Inopus.*  
" 18, " 20 " instead of *Aissa*, read *Antissa.*  
" 19, " 15 from top, instead of *fourth cell of posterior margin*, read *fourth posterior cell.*  
Page 21, lines 17 and 12 from bottom, instead of *Obsebius*, read *Opsebius.*  
(The same name must be corrected in the Index.)  
Page 38, line 17 from bottom, instead of *legs proportionately short*, read *legs very long and slender, with the tarsi proportionately short.*  
Page 39, line 12 from bottom, instead of *generally*, read *mostly.*  
" 40, " 12 " instead of *with no* read *without.*  
" 42, " 6 " instead of *tarsi* read *tibiae.*  
" 47, *Asteidæ*; add at the end: (*Sigalotssa* alone has a posterior cross-vein).  
Page 55, line 4 from top, instead of *is*, read *it is.*  
" 56, " 4 from bottom, instead of *and*, read *or.*  
" 57, " 6 from top, instead of *and*, read *or.*  
" 70, " 10 " instead of *short*, read *thin.*  
" 75, " 4 " instead of *edge*, read *border.*  
" 90, " 12 from bottom, instead of 23, read 24.  
" 91, " 20 from top, instead of *first* read *fifth.*  
" 178, " 10 from bottom, before the word "*longitudinal*", add *fourth.*
- 

VOLUME II.

- Page 299, lines 7 from top and 13 from bottom, instead of *Nordhausen*, read *Nordshausen.*



## CORRECTIONS TO VOLUME IV.

(By C. R. OSTER-SACKEN.)

Page 2, line 6 from bottom, instead of *general*, read *common*.

" 16, " 5 from top, instead of p. 11, read p. 387.

" 23, " 8 " instead of *auxiliary*, read *subcostal* (this error occurs twice on the same line).

Page 129, line 3 from bottom, instead of *all the*, read *most*.

" 132, lines 2, 4, 14, 15 from bottom, instead of *Puratropeza*, read *Paratropeza*.

The same error occurs on page xi, line 4 from bottom.

" 49, " 18 "

" 333, " 2 from top.

" 343, " 3 from bottom, column first.

" 345, " 8 "

Page 134, line 4 from bottom, strike out *lin*.

" 159, " 15 " instead of *is*, read *are*.

" 179, " 19 from top, instead of 1822, read 1829.

" 219, " 4 from bottom, before *yellowish*, insert *femora*.

" 249, lines 15 and 16 from bottom: the quotation from Doleschall given here refers to his paper in pamphlet form; the full quotation may be found on page 16, line 5 from top, where p. 387 should be read, instead of p. 11.

Page 275, line 11 from top, instead of *pauperu*, read *pauper*.

The same error occurs on page x, line 4 from top, column first.

" 277, " 5 "

" 278, " 3 "

" 344, " 4 from bottom, column sec'd.

Page 293, line 13 from top, instead of *ruficornis* Wied. and *erythrocephala* Macq., read *ruficornis* Macq. and *erythrocephala* Wied.

Page 295, line 3 from bottom, instead of p. 15, read p. 391.

" 331, " 18 from top, instead of 17, read 14.



## ADDITIONS TO VOLUME IV.

(By C. R. OSTEN-SACKEN.)

Page 4. **Ptychoptera.** The larvæ of this genus examined by Brauer, differ from all the known larvæ of Tipulidæ in having the head not imbedded up to the mouth in the first thoracic segment, but entirely free. This observation justifies the isolated position which I have given to this group in the family. Compare Verh. Zool. Bot. Ges. 1869, p. 844.

Page 23. The analytical table, given here, would be improved by being modified thus:—

### I. A single submarginal cell.

Antennæ 14-jointed.

Antennæ 16-jointed.

Empodia indistinct or none.

Sect. II. *Limnobina anomala*.

Sect. I. *Limnobina*.

### II. Two submarginal cells. Empodia distinct, etc. etc.

Page 49. The same modification may be made on this page.

Page 57. **Dicranomyia.** My remarks concerning the differences between this genus and *Limnobia* apply to those North American and European species which I had occasion to compare. I have accumulated as many distinctive characters as a careful comparison of the material before me could disclose; but I should not wonder at all if forms occurred the location of which remained doubtful, all the enumerated distinctive characters notwithstanding.

Page 81. Mr. Loew draws my attention to the fact, that the antennæ of *Rhipidia* cannot be properly called *pedicelled*, because the short stems, connecting the joints, are processes of the anterior part of the joint and not of the posterior one.

Page 102. **Styringomyia.** During my passage through Stockholm in 1872, I made the interesting discovery that this genus, besides its occurrence in amber and copal, is found living in Africa. I saw several specimens among the unnamed diptera from Caffraria (from Wahlberg's voyage) in the Stockholm Museum. The species was apparently different from that included in copal, which I possess.



Page 115. *Toxorhina muliebris* O. S. ♂. I found three males and one female near Tarrytown, N. Y., in July, 1871. They all have the discal cell open, which, therefore, seems to be the rule in this species. The stripes of the thorax are dark brown; the position of the great crossvein is variable, sometimes at the very basis of the discal cell, sometimes before it.

Page 138, at the bottom. *Sigmatomera*. I described this new genus, from Mexico, without adding the description of the typical species, which, as I anticipated, would be soon published in a new fascicle of Mr. Bellardi's *Saggio*, etc. This publication having been, in the mean time, indefinitely postponed, it becomes necessary to supply the above mentioned omission.

*Sigmatomera flavipennis* n. sp.—Yellow, antennæ long, black, except the first joint, which is yellow; front feet and middle femora yellow (the remaining feet as well as the middle tibiae and tarsi, are wanting). Wings tinged with yellowish; central crossveins and fifth vein slightly bordered with brown. Long. corp. 0.56—0.6; long. al. 0.64.

*Hab.* Mexico (Sumichrast).

Page 173. *Psiloconopa*. I had occasion to examine specimens of *P. Meigenii* Zett., since the publication of Vol. IV, and have become aware that my opinion about its location was erroneous. This genus is related to *Trimicra*, and its venation is exactly like the latter genus, the subcostal crossvein being quite remote from the tip of the auxiliary vein. The two other European species, mentioned on pages 173 and 174 as *Psiloconopæ*, do not belong to this genus at all, and are much better placed in the genus *Goniomyia*. The above correction will necessitate changes in all the passages, where the genus *Psiloconopa* is mentioned. Such passages are the following:—

Page 21, line 4 from bottom, instead of *Psiloconopa*?, read *Goniomyia*?

" 36, " 7 from bottom, strike out the whole passage beginning with *is represented*.

Page 36, line 3 from bottom, add *Psiloconopa*.

" 47, modify the analytical table thus:—

29	{	The distance, etc.	30
		The distance, etc.	Gen. XXII. GNOPHOMYIA.
30	{	Seventh longitudinal vein straight; Tab. II, f. 1.	31
		Seventh longitudinal vein conspicuously bisinuated; Tab. I, fig. 20.	Gen. XXI. SYMPLECTA.
31	{	Three terminal joints of the antennæ abruptly smaller.	Gen. XVIII. TRIMICRA.
		Three terminal joints, etc., not abruptly smaller.	Gen. XX. PSILOCONOPA.





Page 49, line 14 from bottom, transfer Gen. XXII. *Psiloconopa*, as Gen. XX, after *Chionea*.

Page 135, line 2 from bottom, strike out the passage beginning with "I believe now" and ending with "typical Eriopterina."

Page 137, line 11 from top, instead of *Psiloconopa*, read *Goniomyia*.

" 173, line 13 from bottom, strike out the whole paragraph beginning with the words: "A genus closely allied, etc.," as well as its continuation on the next page, down to the "Description of the species."

Page 176. Gen. XXII. *Psiloconopa* should be placed between *Chionea* and *Symplecta* as Gen. XX. with the following notice: Established by Zetterstedt in 1840 (*Fauna Lapponica*, p. 847), and later in *Dipt. Scand.* X, p. 4007, upon a single species, found in Sweden. This genus, as far as I have been able to study it upon a dry specimen, is related to *Trimicra*, and its venation is exactly the same, the subcostal crossvein being quite remote from the tip of the auxiliary vein, etc. However, it does not have the last three antennal joints abruptly smaller, and its general appearance is altogether different.

Page 177, line 10 from bottom, strike out the passage beginning with the words: "The majority" down to the bottom of the page, and read as follows instead: Some European species differ from the American ones in the following characters: in their coloring the black prevails over the yellow; only a few traces of the latter color are left; the auxiliary vein seems to extend much farther beyond the origin of the præfurea than is the case in the American species; the structure of the male forceps seems also to show some differences, which, however, I have not been able to ascertain, not having had fresh specimens for comparison. Such species are the *Erioptera lateralis* Macq., *Hist. Nat. Dipt.* II, p. 653 (Syn. *Limnobia flavolimbata* Hal., in Walker's *Ins. Brit. Dipt.* III, p. 304); the *Goniomyia scutellata* Egger and *G. cincta* Egger, in Schiner's *Fauna Austriaca*, Diptera. One of the latter may be synonymous with the former, and Dr. Schiner was perfectly right in referring them to the genus *Goniomyia*. All these species are not unlike the American species of *Gnophomyia* in their general appearance; they differ, nevertheless, in the absence of the marginal crossvein, in the shortness of the first submarginal cell, in the diverging direction of the branches of the fork which form it, and in the presence of yellow in the coloring. It is not impossible, however, that forms of transition may be discovered between these two genera, as well as between them and *Empeda*.



Page 219. *Limnophila inornata* O. S. ♂.—This species was quite common near Tarrytown, N. Y., in June, 1871. Two females which I have before me have the stigma somewhat tinged with brown; the brown at the tip of the femora is more abruptly marked. In the above-quoted description, p. 219, line 4 from bottom, the word *femora* must be added before the word *yellowish*. On the following page, line 5 from top, instead of *about*, read *somewhat less than*. The fore tarsi of the females are shorter than those of the male. The length of the second posterior cell is variable.

Page 260. *Polymera*. This South American genus, never seen by me before the publication of my volume, was doubtfully mentioned among the *Amalopina*. Mr. Loew had opportunities of examining good specimens recently, and published the result in a paper entitled *Über die systematische Stellung d. Gatt. Polymera* Wied. (*Zeitschr. f. d. gesammten Naturwiss.* Neue Folge, 1871, Bd. III, Tab. V, f. 1, 2). It appears now that the antennæ of *Polymera* are not 28-jointed, as was stated by former authors, but 16-jointed, and that there cannot exist the slightest doubt about its location among the *Limnophilina*. It has peculiarities, however, which distinguish it from the ordinary *Limnophilina* of Europe and North America: a remarkably elongated third antennal joint, a structure of the following joints, in the male, which makes them appear double (hence the error of former authors), an open discal cell, and both branches of the fourth longitudinal vein forked (contrary to the rule stated on page 201, No. 2); the wingveins have a rather conspicuous pubescence. Mr. Loew ends his article with a statement of the principal characters of *Polymera*, as recognized by him, which I reproduce here, with a slight modification:—

*Polymera*.—The number of antennal joints is normal, 16; the first joint of the flagellum is remarkably elongated, cylindrical, beset with long, erect hairs; each of the following joints, in the male, shows two consecutive knots, or swellings, every one of which is provided with a distinct verticil of hairs; in the female, these joints are simply cylindrical, and beset with hairs like the first joint of the flagellum. Wingveins beset with a long pubescence; subcostal crossvein only a short distance from the tip of the auxiliary vein; marginal crossvein distinct, inserted on, or a little beyond the middle of the very long submarginal cell; basal cells comparatively rather short; discal cell open, coalescent with the third posterior cell; five posterior cells; the second with a petiole of a very great length; feet long and slender; tibiae with very small but distinct spurs; ungues and empodia very small.



SMITHSONIAN MISCELLANEOUS COLLECTIONS.

261

# DIRECTIONS

FOR

COLLECTING AND PRESERVING

# INSECTS.

PREPARED FOR THE USE OF

THE SMITHSONIAN INSTITUTION,

BY

A. S. PACKARD, JR., M.D.



WASHINGTON:  
SMITHSONIAN INSTITUTION.  
SEPTEMBER, 1873.

## ADVERTISEMENT.

---

IN the Smithsonian Report for 1858, a paper was published on the method of collecting and preserving insects, prepared by Baron Ostensacken, of the Russian Legation, with contributions by other eminent entomologists, which has rendered valuable service in the way of awakening an interest in Entomology and in facilitating the collecting of specimens. It was, however, not stereotyped, and as the methods of gathering and preserving insects have been much improved since its date, it has been thought advisable to request Dr. Packard, as a leading authority, to furnish a new treatise on the same subject. In compliance with this request he has prepared the following pages, derived mainly from the "Guide to the Study of Insects,"\* though with some additions and corrections, corresponding with the present state of our knowledge.

JOSEPH HENRY,

*Secretary Smithsonian Institution.*

SMITHSONIAN INSTITUTION,

Washington, September, 1873.

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\* Published by the Naturalists' Agency, Salem, Mass. 8vo.

(11)

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## DIRECTIONS FOR COLLECTING AND PRESERVING INSECTS.

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### GENERAL CONSIDERATIONS.

INSECTS differ sexually in that the female often appears to have one abdominal ring less (one ring disappearing during the semi-pupa state, when the ovipositor is formed), and in being larger, fuller, and duller colored than the males, while the latter often differ in sculpture and ornamentation. In collecting, whenever the two sexes are found united they should be pinned upon the same pin, the male being placed highest. When we take one sex alone we may feel sure that the other is somewhere in the vicinity; perhaps while one is flying about so as to be easily captured the other is hidden under some leaf, or resting on the trunk of some tree near by, which must be examined and every bush in the vicinity vigorously beaten by the net. Many species rare in most places have a *metropolis* where they occur in great abundance. During seasons when his favorites are especially abundant, the collector should lay up a store against years of scarcity.

At no time of the year need the entomologist rest from his labors. In the winter, under the bark of trees and in moss, he can find many species, or detect their eggs on trees, etc., which he can mark for observation in the spring when they hatch out.

He need not relax his endeavors day or night. Nothing is night employment. Skunks and toads entomologize at night. Early in the morning, at sunrise, when the dew is still on the leaves, insects are sluggish and easily taken with the hand; so at dusk, when many species are found flying; and in the night, the collector will be rewarded with many rarities, some

species flying then that hide themselves by day, while many caterpillars leave their retreats to come out and feed, when the lantern can be used with success in searching for them.

✓ Wollaston (Entomologist's Annual, 1865) states that sandy districts, especially towards the coast, are at all times preferable to clayey ones, but the intermediate soils, such as the loamy soil of swamps and marshes, are more productive. Near the sea, insects occur most abundantly beneath pebbles and other objects in grassy spots, or else at the roots of plants. In many places, especially in alpine tracts, as we have found on the summit of Mt. Washington and in Labrador, one has to lie down and look carefully among the short herbage and in the moss for Coleoptera.

The most advantageous places for collecting are gardens and farms, the borders of woods and the banks of streams and ponds. The deep, dense forests, and open, treeless tracts are less prolific in insect life. In winter and early spring the moss on the trunks of trees, when carefully shaken over a newspaper or white cloth, reveals many beetles and Hymenoptera. In the late summer and autumn, toadstools and various fungi and rotten fruits attract many insects, and in early spring when the sap is running we have taken rare insects from the stumps of freshly cut hard-wood trees. Wollaston says, "Dead animals, partially dried bones, as well as the skins of moles and other vermin which are ordinarily hung up in fields, are magnificent traps for Coleoptera; and if any of these be placed around orchards and inclosures near at home, and be examined every morning, various species of *Nitidulæ*, *Silphidæ*, and other insects of similar habits, are certain to be enticed and captured.

"Planks and chippings of wood may be likewise employed as successful agents in alluring a vast number of species which might otherwise escape our notice, and if these be laid down in grassy places, and carefully inverted every now and then with as little violence as possible, many insects will be found adhering beneath them, especially after dewy nights and in showery weather. Nor must we omit to urge the importance of examining the under sides of stones in the vicinity of ants' nests, in which position, during the spring and summer months, many of the rarest of our native Coleoptera may be occasion-

ally procured." Excrementitious matter always contains many interesting forms in various stages of growth.

The trunks of fallen and decaying trees offer a rich harvest for many wood-boring larvæ, especially the Longicorn beetles; and weevils can be found in the spring, in all stages. Numerous carnivorous Coleopterous and Dipterous larvæ dwell within them, and other larvæ which eat the dust made by the borers. The inside of pithy plants like the elder, raspberry, blackberry, and syringa, is inhabited by many of the wild bees, *Osmia*, *Ceratina*, and the wood-wasps, *Crabro*, *Stigma*, etc., the habits of which, with those of their Chalcid and Ichneumon parasites, offer endless amusement and material for study.

Ponds and streams shelter a vast throng of insects, and should be diligently dredged with the water-net, and stones and pebbles should be overturned for aquatic beetles, Hemiptera and Dipterous larvæ.

The various sorts of galls should be collected in spring and autumn and placed in vials or boxes, where their inhabitants may be reared, and the rafters of out-houses, stone-walls, etc., should be carefully searched for the nests of mud-wasps.

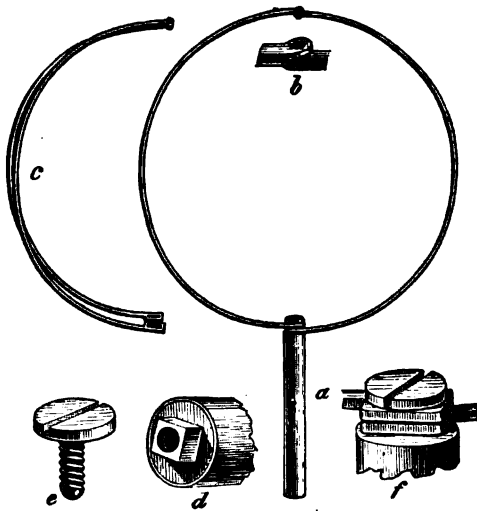
*Collecting Apparatus.* First in importance is the *net*. (Fig. 1.) This is made by attaching a ring of brass wire to a handle made to slide on a pole six feet long. The net may be a foot in diameter, and the bag itself made of thin gauze or mosquito-netting (the finer, lighter, and more durable the better), and should be about twenty inches deep. It should be sewed to a narrow border of cloth placed around the wire. A light net like this can be rapidly turned upon the insect with one hand. The insect is captured by a dexterous twist which also throws the bottom over the mouth of the net. "The frame of the net which I use is illustrated herewith (Fig. 2), and will be found strong and serviceable and conveniently portable. It is constructed as follows: Take two pieces of stout brass wire, each about 20 inches long; bend them half-circularly and join at one end by a folding hinge having a check on one side (*b*). The other ends are bent and beaten into two square sockets (*f*)

Fig. 1.



which fit to a nut sunk and soldered into one end of a brass tube (*d*). When so fitted, they are secured by a large-headed screw (*e*) threaded to fit into the nut-socket, and with a groove wide enough to receive the back of a common pocket knife blade. The wire hoop is easily detached and folded, as at *c*, for convenient carriage; and the handle may be made of any desired length by cutting a stick and fitting it into the hollow tube *a*, which should be about six inches long. It is well to have two separate hoops—one of lighter wire furnished with silk gauze or some other light material for catching flying in-

Fig. 2.



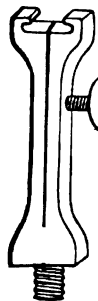
sects; and one which is stouter and furnished with a net of stronger material for sweeping non-flying specimens.

"Another still more simple, but less convenient, frame is thus described by my friend F. G. Sanborn, of Boston, Mass.:

"Make a loop of strong iron or brass wire, of about 3-16ths of an inch in thickness, so that the diameter of the loop or circle will not exceed twelve inches, leaving an inch to an inch and a half of wire at each end bent at nearly right angles. Bind the two extremities of the wire together with smaller wire and tin them by applying a drop of muriate of zinc, then holding it in the fire or over a gas flame until nearly red hot, when a few grains of block tin or soft solder placed upon

them will flow evenly over the whole surface and join them firmly together. Take a Maynard rifle cartridge tube, or other brass tube of similar dimensions; if the former, file off the closed end or perforate it for the admission of the wire, and having tinned it in the same manner on the inside, push a tight fitting cork half-way through and pour into it melted tin or soft solder, and insert the wires; if carefully done, you will have a firmly constructed and very durable foundation for a collecting net. The cork being extracted will leave a convenient socket for inserting a stick or walking cane to serve as a handle.'

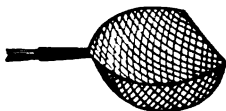
Fig. 3.



"My friend, J. A. Lintner, of Albany, New York, makes very good use, in his ordinary promenades, of a telescopic fish-rod, with a head (Fig. 3) screwed on to one end, in which to fasten an elastic brass coil on which the net is drawn, but which when not in use sets snugly inside his silk hat." (C. V. Riley, Fifth Annual Report Ins. Mo., 1873.)

The insect should be temporarily held between the thumb and forefinger of the hand at liberty, and then pinned through the thorax while in the net. The pin can be drawn through the meshes upon opening the net. The *beating-net* should be made much stouter, with a shallower cloth bag and attached to a shorter stick. It is used for beating trees, bushes, and herbage for beetles and Hemiptera and various larvæ. Its thorough use we would recommend in the low vegetation on mountains and in meadows.

Fig. 4.



The *water-net* may be either round or of the shape indicated in Fig. 4. The ring should be made of brass, and the shallow net of grasscloth or coarse millinet. It is used for collecting aquatic insects.

Various sorts of *forceps* are indispensable for handling insects. Small delicate narrow-bladed forceps, with fine sharp points, such as are used by jewellers, and made either of steel or brass, are excellent for handling minute specimens. For larger ones long, curved forceps (Fig. 5, after Riley) are very convenient. For pinning insects into boxes the forceps should be stout, the blades blunt and curved at the end so that the insects can be pinned without slanting the forceps much. The

ends need to be broad and finely indented by lines so as to hold the pin firmly. With a little practice the forceps soon take the place of the fingers. They will have to be made to order by a neat workman or surgical instrument maker. Fig.

Fig. 5.



6, after Riley, illustrates another form. Some persons use the ordinary form of pliers with curved handles, but they should be long and slender. A spring set in to separate the handles when not grasped by the hand is a great convenience.



Various pill-boxes, vials and bottles must always be taken, some containing alcohol or whiskey. Many collectors use a wide-mouthed bottle, containing a sponge saturated with ether, chloroform, or benzine, or bruised laurel leaves, the latter being pounded with a hammer and then cut with scissors into small pieces, which give out exhalations of prussic acid strong enough to kill most small insects.

Besides these the collector needs a small box lined with corn-pith, or cork, and small enough to slip into the coat-pocket; or a larger box carried by a strap. Most moths and small flies can be pinned alive without being pinched (which injures their shape and rubs off the scales and hairs), and then killed by pouring a little benzine into the bottom of the box.

*Killing Insects for the Cabinet.* Care in killing affects very sensibly the looks of the cabinet. If hastily killed and distorted by being pinched, with the scales rubbed off and other-

wise mangled, the value of such a specimen is diminished either for study or the neat appearance of the collection.

Besides the vapor of ether, chloroform and benzine, the fumes of sulphur readily kill insects. Large specimens may

Fig. 6.



be killed by inserting a pin dipped in a strong solution of oxalic acid. An excellent collecting bottle is made by putting into a wide-mouthed bottle two or three small pieces of cyanide of potassium, which may be covered with cotton, about half-filling the bottle (Figure 7, after Riley). The cotton may be covered with paper lightly attached to the glass and pierced with pin-holes; this keeps the insects from being lost in the bottles. For Diptera, Loew recommends moistening the bottom of the

collecting box with creosote. This is excellent for small flies and moths, as the mouth of the bottle can be placed over the insect while at rest; the insect flies up into the bottle and is immediately suffocated. A bottle well prepared will, according to Laboulbène, last several months, even a year, and is vastly superior to the old means of using ether or chloroform. He states, "the inconvenience of taking small insects from a net is well known, as the most valuable ones usually escape; but by placing the end of the net, filled with insects, in a wide-mouthed bottle, and putting in the cork for a few minutes, they will be suffocated." A chloroform bottle with a brush securely inserted in the cork (Fig. 8, after Riley) is often convenient.

Fig. 7.



*Pinning Insects.* The pin should be inserted through the thorax of most insects. The Coleoptera, however, should be pinned through the right wing-cover (Fig. 9); many Hemiptera

are best pinned through the scutellum (Fig. 10). The specimens should all be pinned at an equal height, so that about one-fourth of the pin should project above the insect.

The best pins are those made in Germany. For very minute insects very small pins are made. They may be used to impale minute insects upon, and then stuck through a bit of cork, or pith, through which a large, long pin may be thrust.

Fig. 9.



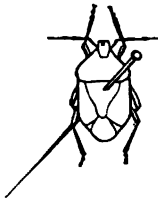
Then the specimen is kept out of the reach of devouring insects. Still smaller pins are made by cutting off bits of very fine silvered wire at the right length, which may be thrust by the forceps into a piece of pith, after the insects have been impaled upon them.

Small insects, especially beetles, may be mounted on cards or pieces of mica through which the pin may be thrust. The French use small oblong bits of mica, with the posterior half covered with green paper on which the number may be placed. The insects may be gummed on the clear part, the two sexes together. The under side can be seen through the thin mica.

Others prefer triangular pieces of card, across the end of which the insect may be gummed, so that nearly the whole under side is visible.

Mr. Wollaston advocates gumming small Coleoptera upon cards. Instead of cutting the pieces of card first, he gums them promiscuously upon a sheet of card-board. "Having gummed thickly a space on your card-board equal to, at least, the entire specimen when expanded, place the beetle upon it, drag out the limbs with a pin, and, leaving it to dry, go on with the next one that presents itself. As the card has to be cut afterwards *around* your insect (so as to suit it), there is no advantage in gumming it precisely *straight upon your frame*,—though it is true that a certain amount of care in this respect lessens your after labor of cutting off very materially. When your frame has been filled, and you are desirous of separating the species, cut out the insects with finely pointed scissors."

Fig. 10.



For mending broken insects, *i. e.*, gumming on legs and an-



tennae which have fallen off, inspissated ox-gall, softened with a little water, is the best gum.

For gumming insects upon cards, Mr. Wollaston recommends a gum "composed of three parts of tragacanth to one of Arabic, both in powder; to be mixed in water containing a grain of corrosive sublimate, without which it will not keep, until of a consistency just thick enough to run. As this gum is of an extremely absorbent nature, nearly a fortnight is required before it can be properly made. The best plan is to keep adding a little water, and stirring it every few days, until it is of the proper consistency. It is advisable to dissolve the grain of corrosive sublimate in the water which is poured *first* upon the gum."

*Preservative Fluids.* The best for common use is alcohol, diluted with a little water; or whiskey, as alcohol of full strength is too strong for caterpillars, etc., since it shrivels them up. The spirits should afterwards be changed for alcohol of full strength for permanent preservation. Glycerine is excellent for preserving the colors of caterpillars, though the internal parts decay somewhat, and the specimen is apt to fall to pieces on being roughly handled.

Laboulbène recommends, for the preservation of insects in a fresh state, plunging them in a preservative fluid consisting of alcohol with an excess of arsenic acid in fragments, or the common white arsenic of commerce. A pint and a half of alcohol will take about fourteen grains (troy) of arsenic. The living insect, put into this preparation, absorbs about  $\frac{1}{1000}$  of its own weight. When soaked in this liquor and dried, it will be safe from the ravages of moths, *Anthrenus* or *Dermestes*. This liquid will not change the colors of blue, green or red beetles if dried after soaking from twelve to twenty-four hours. Hemiptera and Orthoptera can be treated in the same way.

A stay of a month in this arseniated alcohol mineralizes the insect, so that it appears very hard, and, after drying, becomes glazed with a white deposit which can, however, be washed off with alcohol. In this state the specimens become too hard for dissection and study, but will do for cabinet specimens designed for permanent exhibition.

Another preparation recommended by Laboulbène is alcohol containing a variable quantity of corrosive sublimate, but the

latter has to be weighed, as the alcohol evaporates easily, the liquor becoming stronger as it gets older. The strongest solution is one part of corrosive sublimate to one hundred of alcohol; the weakest and best is one-tenth of a part of corrosive sublimate to one hundred parts of alcohol. Insects need not remain in this solution more than two hours before drying. Both of these preparations are very poisonous and should be handled with care. The last-named solution preserves specimens from mould, which will attack pinned insects during damp summers.

A very strong brine will preserve insects until a better liquor can be procured. Professor A. E. Verrill recommends two simple and cheap solutions for preserving, among other specimens, the larvæ of insects "with their natural color and form remarkably perfect." The first consists of two and a half pounds of common salt and four ounces of nitre dissolved in a gallon of water and filtered. Specimens should be prepared for permanent preservation in this solution by being previously immersed in a solution consisting of a quart of the first solution and two ounces of arseniate of potash and a gallon of water.

The nests, cocoons, and chrysalides of insects may be preserved from injury from other insects by being soaked in the arseniated alcohol, or dipped into benzine, or a solution of carbolic acid or creosote.

Dr. J. L. Leconte has published in the "American Naturalist," iii, p. 307, some new directions for the preservation of insects which will apply to beetles as well as other insects. "Surgical art has given to us an instrument by which a poisonous liquid can be rapidly and most effectively applied to the entire surface of large numbers of specimens as they stand in the cabinet boxes, without the trouble of moving them. I refer to the 'Atomizer.'

"Opinions may vary as to the nature of the liquid poison to be used, but after several trials I have found the following formula to be quite satisfactory; it produces no efflorescence, even on the most highly polished species, while the odor is quite strong, and persistent enough to destroy any larvæ or eggs that may be already in the box:—saturated alcoholic solution of arsenious acid, eight fluid ounces; strychnine,

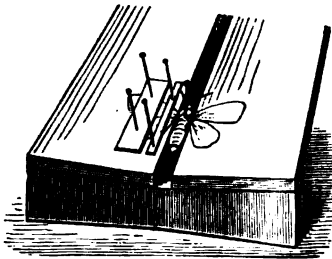
twelve grains ; crystallized carbolic acid, one drachm ; mineral naphtha (or heavy benzine) and strong alcohol, enough to make one quart. I have not stated the quantity of naphtha, since there are some varieties of light petroleum in commerce which dissolve in alcohol only to a slight extent. These should not be used. The heavier oils which mix indefinitely with alcohol are the proper ones, and for the two pints of mixture ten to twelve fluid ounces of the naphtha will be sufficient. Care should be taken to test the naphtha on a piece of paper. If it leaves a greasy stain which does not disappear after a few hours it is not suitable for this purpose.

"The best form of atomizer is the long, plated, reversible tube ; it should be worked with a gum elastic pipe, having two bulbs to secure uniformity in the current. The atomizing glass tubes and the bottle, which usually accompany the apparatus, are unnecessary ; a common narrow necked two ounce bottle will serve perfectly to hold the fluid."

*Preparing Insects for the Cabinet.* Dried insects may be moistened by laying them for twelve or twenty-four hours in a box containing a layer of wet sand, covered with one thickness of soft paper. Their wings can then be easily spread. *Setting-boards* for spreading the wings of insects may be made by sawing deep grooves in a thick board, and placing a strip of pith or cork at the bottom. The groove may be deep enough to allow a quarter of the length of the pin to project above the insect. The setting-board usually consists of thin parallel strips of board, leaving a groove between them wide enough to receive the body of the insect, at the bottom of which a strip of cork or pith should be glued. The ends of the strips should be nailed on to a stouter strip of wood, raising the surface of the setting-board an inch and a half, so that the pins can stick through without touching. Several setting-boards can be made to form shelves in a frame covered with wire gauze, so that the specimens may be preserved from dust and destructive insects, while the air may at the same time have constant access to them. The surface of the board should incline a little towards the groove for the reception of the insect, as the wings often gather a little moisture, relax and fall down after the insect is dried. "For the proper setting of insects with broad and flattened wings, such as butterflies and moths, a spreading

board or stretcher is necessary. One that is simple and answers every purpose is shown at figure 11. It may be made of two pieces of thin white-wood or pine board, fastened together by braces, especially at the ends, and left wide enough apart to admit the bodies of the insects to be spread: strips of cork or pith, in which to fasten the pins, may then be tacked or glued below so as to cover the intervening space. The braces must be deep enough to prevent the pins from touching anything on which the stretcher may be laid; and, by attaching a ring or loop to one of them, the stretcher may be hung against a wall, out of the way. For ordinary-sized specimens I use boards 2 feet long, 3 inches wide and  $\frac{1}{4}$  inch thick, with three braces (one in the middle and one at each end)  $1\frac{1}{2}$  inches deep at the ends, but narrowing from each end to  $1\frac{1}{8}$  inches at the middle. This slight rising from the middle is to counteract the tendency of

Fig. 11.



the wings, however well dried, to drop a little after the insect is placed in the cabinet. The wings are held in position by means of strips of paper (Fig. 11) until dry." (Riley.)

Moths of medium size should remain two or three days on the setting-board, while the larger thick-bodied sphinges and *Bombycidæ* require a week to dry. The wings can be arranged by means of a needle stuck into a handle of wood. They should be set horizontally, and the front margin of the fore wings drawn a little forward of a line perpendicular to the body, so as to free the inner margin of the hind wings from the body, that their form may be distinctly seen. When thus arranged, they can be confined by fine threads drawn over the wings, by pieces of card pinned to the board as indicated in figure 11, or, as we prefer, by square pieces of glass laid upon them.

After the insects have been thoroughly dried they should not be placed in the cabinet until after having been in quarantine to see that no eggs of *Dermestes* or *Anthrenus*, etc., have been deposited on them.

For preserving dried insects in the cabinet Laboulbène rec-

ommends placing a rare insect (if a beetle or any other hard insect) in water for an hour until the tissues are softened. If soiled, an insect can be cleansed under water with a fine hair-pencil, then submit it to a bath of arseniated alcohol with corrosive sublimate. If the insect becomes prune-colored, it should be washed in pure alcohol several times. This method will do for the rarest insects; the more common ones can be softened on wet sand, and then the immersion in the arseniated alcohol suffices. After an immersion of from a quarter of an hour to an hour, according to the size of the insect, the pin is not affected by the corrosive sublimate, but it is better to unpin the insect previous to immersion, and then pin it when almost dry.

For cleaning insects ether or benzine is excellent, applied with a hair-pencil; though care should be taken in using these substances, which are very inflammable.

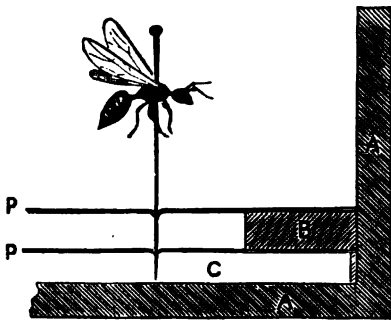
After the specimens are placed in the cabinet, they should be farther protected from destructive insects by placing in the drawers or boxes pieces of camphor wrapped in paper perforated by pin-holes, or bottles containing sponges saturated with benzine. The collection should be carefully examined every month; the presence of insects can be detected by the dust beneath them. Where a collection is much infested with destructive insects, benzine should be poured into the bottom of the box or drawer, when the fumes and contact of the benzine with their bodies will kill them. The specimens themselves should not be soaked in the benzine if possible, as it renders them brittle. ✓

*Insect-cabinet.* For permanent exhibition, a cabinet of shallow drawers, protected by doors, is most useful. A drawer may be eighteen by twenty inches square, and two inches deep in the clear, and provided with a tight glass cover. For constant use, boxes made of thin, well-seasoned wood, with tight fitting covers, are indispensable. For Coleoptera, Dr. Leconte recommends that they be twelve by nine inches (inside measurement). For the larger Lepidoptera a little larger box is preferable. Others prefer boxes made in the form of books, which may be put away like books on the shelves of the cabinet, though the cover of the box is apt to be in the way.

The boxes and drawers should be lined with cork cut into

thin slips for soles; such slips come from the cork-cutter about twelve by four inches square, and an eighth of an inch thick. A less expensive substitute is paper stretched upon a frame. Prof. E. S. Morse has given in the "American Naturalist" (vol. i, p. 156) a plan which is very neat and useful for lining boxes in a large museum, and which are designed to be placed in horizontal show-cases (Fig. 12). "A box is made of the required depth, and a light frame is fitted to its interior. Upon the upper and under surfaces of this frame, a sheet of white paper (drawing or log-paper answers the purpose) is securely glued. The paper, having been previously damped, in drying contracts and tightens like a drum-head. The frame is then secured about one-fourth of an inch from the bottom of the box, and the pin is forced down through the thicknesses of

Fig. 12.



paper, and if the bottom of the box be of soft pine, the point of the pin may be slightly forced into it. It is thus firmly held at two or three different points, and all lateral movements are prevented. Other advantages are secured by this arrangement besides firmness; when the box needs cleaning

or fumigation, the entire collection may be removed by taking out the frame; or camphor, tobacco, or other material can be placed on the bottom of the box, and concealed from sight. The annexed figure represents a transverse section of a portion of the side and bottom of the box with the frame. A, A, box; B, frame; P, P, upper and under sheets of paper; C, space between lower sheets of paper and bottom of box."

Other substitutes are the pith of various plants, especially of corn; and palm wood, and "inodorous felt" are used, being cut to fit the bottom of the box.

Leconte recommends that "for the purpose of distinguishing specimens from different regions, little disks of variously colored paper be used; they are easily made by a small punch, and should be kept in wooden pill-boxes ready for use; at the

same time a key to the colors, showing the regions embraced by each, should be made on the fly-leaf of the catalogue of the collection." He also strongly recommends that the "specimens should all be pinned at the same height, since the ease of recognizing species allied in characters is greatly increased by having them on the same level."

He also states that "it is better, even when numbers with reference to a catalogue are employed, that the name of each species should be written on a label attached to the first specimen. Thus the eye is familiarized with the association of the species and its name, memory is aided, and greater power given of identifying species when the cabinet is not at hand." For indicating the sexes the astronomical sign ♂ (Mars) is used for the male, and ♀ (Venus) for the female, and ♀ for the worker.

*Transportation of Insects.* While travelling, all hard-bodied insects, comprising many Hymenoptera, the Coleoptera, Hemiptera, and many Neuroptera should be thrown, with their larvæ, etc., into bottles and vials filled with strong alcohol. When the bottle is filled new liquor should be poured in, and the old may be saved for collecting purposes; in this way the specimens will not soften and can be preserved indefinitely, and the colors do not, in most cases, change. Leconte states that "if the bottles are in danger of being broken, the specimens, after remaining for a day or two in alcohol, may be taken out, partially dried by exposure to the air, but not so as to be brittle, and these packed in layers in small boxes between soft paper; the boxes should then be carefully closed with gum-paper or paste, so as to exclude all enemies."

Lepidoptera and dragon-flies and other soft-bodied insects may be well preserved by placing them in square pieces of paper folded into a triangular form with the edges overlapping. Put up thus, multitudes can be packed away in tin boxes, and will bear transportation to any distance. In tropical climates, chests lined with tin should be made to contain the insect-boxes, which can thus be preserved against the ravages of white ants, etc.

In sending live larvæ by mail, they should be inclosed in little tin boxes, and in sending dry specimens, the box should be light and strong, and directions given at the post-office to

stamp the box lightly. In sending boxes by express they should be carefully packed in a larger box, having an interspace of two inches, which can be filled in tightly with hay or crumpled bits of paper. Beetles can be wrapped in pieces of soft paper. Labels for alcoholic specimens should consist of parchment with the locality, date of capture, and name of collector written in ink. A temporary label of firm paper with the locality, etc., written with a pencil, will last for several years.

*Preservation of Larvæ.* Alcoholic specimens of insects, in all stages of growth, are very useful. Few collections contain alcoholic specimens of the adult insect. This is a mistake. Many of the most important characters are effaced during the drying process, and for purposes of general study alcoholic specimens, even of bees, Lepidoptera, Diptera, and dragonflies are very necessary.

*Larvæ*, generally, may be well preserved in vials or bottles of alcohol. They should first be put into whiskey, and then into alcohol. If placed in the latter first, they shrivel and become distorted. Mr. E. Burgess preserves caterpillars with the colors unchanged, by immersing them in boiling water thirty or forty seconds, and then placing them in equal parts of alcohol and water. It is well to collect larvæ and pupæ indiscriminately; even if we do not know their adult forms we can approximate to them, and in some cases tell very exactly what they must be.

*Rearing Larvæ.* More attention has been paid to rearing caterpillars than the young of any other suborder of insects, and the following remarks apply more particularly to them, but very much the same method may be pursued in rearing the larvæ of beetles, flies, and Hymenoptera. Subterranean larvæ have to be kept in moist earth, aquatic larvæ must be reared in aquaria, and carnivorous larvæ must be supplied with flesh. The larvæ of butterflies are rare; those of moths occur more frequently, while their imagos may be scarce. In some years many larvæ, which are usually rare, occur in abundance, and should then be reared in numbers. In hunting for caterpillars bushes should be shaken and beaten over newspapers or sheets, or an umbrella; herbage should be swept, and trees examined carefully for leaf-rollers and miners. The



best specimens of moths and butterflies are obtained by rearing them from the egg, or from the larva or pupa. In confinement the food should be kept fresh, and the box well ventilated. Tumblers covered with gauze, pasteboard boxes pierced with holes and fitted with glass in the covers, or large glass jars, are very convenient to use as cages. The bottom of such vessels may be covered with moist sand, in which the food-plant of the larva may be stuck and kept fresh for several days. Larger and more airy boxes, a foot square, with the sides of gauze, and fitted with a door, through which a bottle of water may be introduced, serve well. The following extract from Riley's "Fifth Annual Report on the Injurious Insects of Missouri" illustrates his style of vivarium:—

"For larger insects I use a breeding cage or vivarium of my own devising, and which answers the purpose admirably. It is represented in figure 13, and comprises three distinct parts: 1st, the bottom board (a),



Fig. 13.

consisting of a square piece of inch-thick walnut with a rectangular zinc pan (ff), 4 inches deep, fastened to it, above, and with two cross pieces (gg) below, to prevent cracking or warping, facilitate lifting, and allow the air to pass underneath the cage. 2d, a box (b), with three glass sides and a glass door in front, to fit over the zinc pan. 3d, a cap (c), which fits closely on to the box, and has a top of fine wire gauze. To the centre of the zinc pan is soldered a zinc tube (d) just large enough to contain an ordinary quinine bottle. The zinc pan is filled with clean sifted earth or sand

(c), and the quinine bottle is for the reception of the food-plant. The cage admits of abundant light and air, and also of the easy removal of the excrement and frass which fall to the ground; while the insects in transforming enter the ground or attach themselves to the sides or the cap, according to their habits. The most convenient dimensions I find to be 12 inches square and 18 inches high: the cap and the door fit closely by means of rabbets, and the former has a depth of about 4 inches to admit of the largest cocoon being spun in it without touching the box on which it rests. The zinc pan might be made 6 or 8 inches deep, and the lower half filled with sand, so as to keep the whole moist for a greater length of time.

"A dozen such cages will furnish room for the annual breeding of a great number of species, as several having different habits and appearance, and which there is no danger of confounding, may be simultaneously fed in the same cage. I number each of the three parts of each cage to prevent misplacement and to facilitate reference, and aside from the notes made in the notebook, it will aid the memory, and expedite matters, to keep a short open record of the species contained in each cage, by means of slips of paper pasted on to the glass door. As fast as the different specimens complete their transformations and are taken from the cage, the notes may be altered or erased, or the slips wetted and removed entirely. To prevent possible confounding of the different species which enter the ground, it is well, from time to time, to sift the earth, separate the pupæ and place them in what I call imago cages, used for this purpose alone and not for feeding. Here they may be arranged, with reference to their exact whereabouts."

The object is to keep the food-plant fresh, the air cool, the larva out of the sun, and in fact everything in such a state of equilibrium that the larva will not feel the change of circumstances when kept in confinement. Most caterpillars change to pupæ in the autumn; and those which transform in the earth should be covered with earth, kept damp by wet moss, and placed in the cellar until the following summer. The collector in seeking for larvæ should carry a good number of pill-boxes, and especially a close tin box, in which the leaves may be kept fresh for a long time. The different forms and markings of caterpillars should be noted, and they should be drawn

carefully together with a leaf of the food-plant, and the drawings and pupa skins, and perfect insect, be numbered to correspond. Descriptions of caterpillars cannot be too carefully made, or too long. The relative size of the head, its ornamentation, the stripes and spots of the body, and the position and number of tubercles, and the hairs, or fascicles of hairs, or spines and spinules, which arise from them, should be noted, besides the general form of the body. The lines along the body are called *dorsal*, if in the middle of the back; *subdorsal*, if upon one side, *lateral*, and *ventral* when on the sides and under surface, or *stigmatal* if including the *stigmata* or breathing pores, which are generally parti-colored. Indeed, the whole biography of an insect should be ascertained by the observer; the points to be noted are:

1. Date when and how the eggs are laid; and number, size, and marking of the eggs.

2. Date of hatching, the appearance, food-plant of larva, and number of days between each moulting; the changes the larva undergoes, which are often remarkable, especially before the last moulting, with drawings illustrative of these; the habits of the larva, whether solitary or gregarious, whether a day or night feeder; the ichneumon parasites, and their mode of attack. Specimens of larvæ in the different moultings should be preserved in alcohol. The appearance of the larvæ when full-fed, the date, number of days before pupating, the formation and description of the cocoon, the duration of larvæ in the cocoon before pupation, their appearance just before changing, their appearance while changing, and alcoholic specimens of larvæ in the act, should all be studied and noted.

3. Date of pupation; description of the pupa or chrysalis; duration of the pupa state, habits, etc.; together with alcoholic specimens, or pinned dry ones. Lepidopterous pupæ should be looked for late in the summer or in the fall and spring, about the roots of trees, and kept moist in mould until the imago appears. Many Coleopterous pupæ may also occur in mould, and if aquatic, under submerged sticks and stones, and those of borers under the bark of decaying trees.

4. Date when the insect escapes from the pupa, and method of escape; duration of life of the imago; and the number of broods in a season.

*Classification of Insects.* That branch of the Animal Kingdom, known as the *Articulata*, was so called by Cuvier in his work on the animal kingdom, from having the body composed of rings, like short cylinders, which are placed successively one behind the other. In the class of *Worms* these rings or segments are arranged in a continuous row, and their number is indefinite. The organs of locomotion consist of tubercles bearing bristles placed in a row, one on each side of each ring; while on the head-rings there are slender feelers directed forwards and placed around the mouth-opening. In the class of *Crustacea* this continuity of rings is broken, and they for the most part bear hard, jointed appendages; and there is usually a definite number (20), which are gathered into two regions: the head-thorax and abdomen. In the class of *Insects*, the number of rings is still more limited (18), the head, consisting of four rings, is distinctly separated from the thorax, thus forming, with the abdomen or hind-body, three distinct regions.

In the *Insects*, again, there are three modes of disposing the rings and their appendages:—

1. Where the number of segments is indefinite, and much like each other in form, supporting both thoracic and abdominal legs; as in the order of *Myriopoda*.

2. Where the head and thorax are closely united; and there are four pairs of legs attached to the thorax alone, as in the *Arachnida*.

3. Where there are three distinct regions to the body; the head, thorax and abdomen, as in the *Insecta*. Moreover, the true insects have three pairs of legs attached to the thorax; and are, with few exceptions, winged.

✓ The *Myriopods* grow by the addition of rings, after hatching from the egg; the *Arachnids* by frequent moultings of the skin; while the winged insects pass through a distinct metamorphosis. The young insect after being hatched from the egg is called the *larva*, from the Latin term meaning a *mask*, since it was the ancient belief that it concealed beneath its skin the form of the perfect insect. When full-fed the pupa-skin rapidly forms beneath the tegument, and the insect in that form escapes through a slit in the back of the larva. The perfect insect is often called the *imago*. The larval state of

insects which resemble worms has also an analogous form to the Myriopods; so spiders are analogous to Crustacea, while reminding us of the pupa state of the winged insects.

Moreover, worms and crustacea are, generally speaking, aquatic, breathing by gills, while insects are terrestrial and breathe by pores in the side of the body which communicate with a complex system of air tubes, sometimes enclosed by blood vessels. ✓

The order of winged insects is subdivided into seven divisions, occupying an intermediate rank between orders and families, and called by naturalists *suborders*.\* Of these the

Fig. 14.

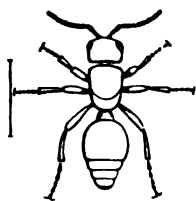
*Mutilla*.

Fig. 15.

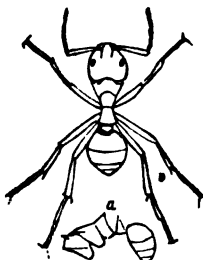
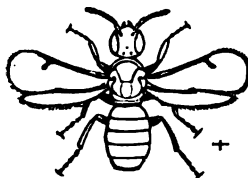
Ant (*Formica*).

Fig. 16.



Chalcid Parasite.

*Hymenoptera* seem to be highest in the scale, and the *Neuroptera* the lowest.

*Hymenoptera* (Bees, Wasps, etc. Fig. 14, *Mutilla*; Fig. 15, Ant; Fig. 16, a Chalcid parasite) are known by their hard, compact bodies, distinct head and thorax, the small, narrow, irregularly veined wings, and by the possession of a hard ovipositor, often forming a poisonous sting. Their transformations are the most complete of all insects, the larva being most generally a white, footless, helpless grub, partly curved, and rapidly tapering at each end. The pupa has the limbs free, contained in a thin, silken cocoon. The species are all terrestrial.

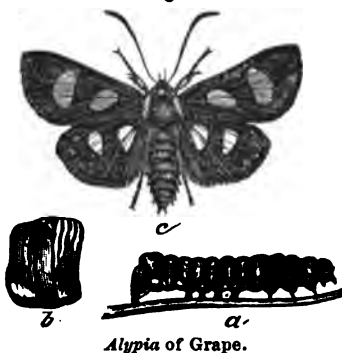
*Lepidoptera* (Butterflies and Moths. Fig. 17, *Alypia*, or grape moth and caterpillar) have the mandibles obsolete, the maxillæ greatly prolonged and rolled up between the labial palpi; their bodies are covered with scales; and the broad, regularly

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\* Or, if preferred, these seven divisions may be regarded as orders, and the three "orders" of insects as subclasses.

veined wings are also covered with dust-like scales. Their transformations are complete. The active larvæ assume a

Fig. 17.

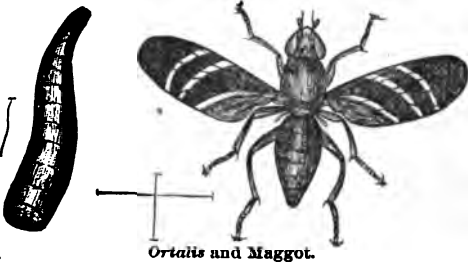


Alypia of Grape.

worm-like form with several pairs (1-5) of fleshy false legs besides the thoracic ones; they spin silken cocoons before changing to pupæ (chrysalides, nymphs), with the exception of the butterflies. The limbs of the chrysalides are soldered together, and the abdomen is movable upon the head and thorax.

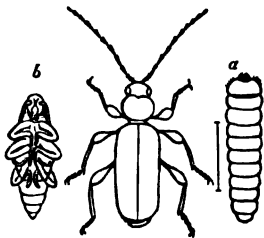
*Diptera* (Flies. Fig. 18, *Ortalis* fly and larva) have the mouth parts formed into a kind of proboscis; the second pair of wings are undeveloped, being reduced to a pair of pedicelled knobs serving as balancers or poisers. Their transformations are complete, the larvæ being maggots or elongated worm-like embryos. The pupæ often change within the skin of the larvæ, which serves as a cocoon. The limbs are free.

Fig. 18.



Ortalis and Maggot.

Fig. 19.



Asemum and young.

Fig. 20.



Potato Beetle.

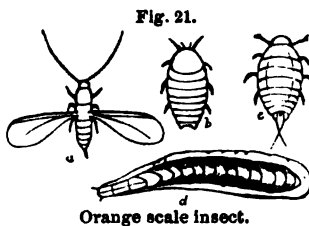
Many of the species are aquatic. Here we first find wingless parasites.

*Coleoptera* (Beetles. ✓

Fig. 19, *Asemum* beetle, *a*, larva, *b*, pupa; fig. 20, Potato beetle) are known by their hard bodies, free and well developed mouth parts, and by the first pair of wings being hardened into sheaths (*elytra*) for the protection of the second

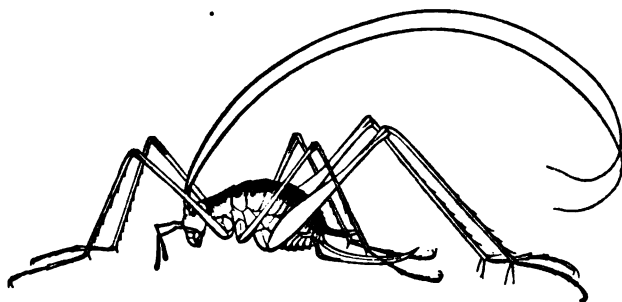
pair. The larvæ, called *grubs*, often have a terminal prop-leg besides the thoracic or true-jointed legs, and pass by a complete metamorphosis to the imago state. The pupæ are often protected by a cocoon, and have their limbs free. Some of the species are aquatic. One family is parasitic, but is winged.

*Hemiptera* (Bugs. Fig. 21, Orange scale insect, *a*, male, *b*, *c*, *d*, larva, female) have the mouth parts formed into a sucking tube. The first pair of wings are often thickened at the base and laid flat upon the abdomen, or are thin, somewhat net-veined, and inclined over the hind body. The transformations are



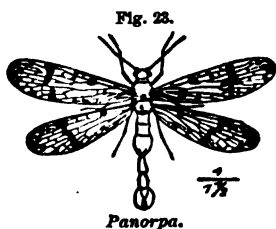
Orange scale insect.

Fig. 22.

*Hadenæcus* of Mammoth Cave.

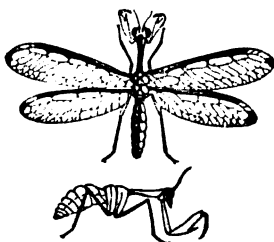
incomplete, as in the Orthoptera. The species are largely aquatic. Some lower groups are true wingless parasites.

*Orthoptera* (Grasshoppers) have free mouth parts, and the organs of nutrition very highly developed. The first pair of wings are still partly hardened to protect the broad, net-veined hind pair which fold up like a fan upon the abdomen. The transformations are not complete, the larvæ and pupæ resembling closely the imagines, both being active. All the species are terrestrial. (Fig. 22 represents a wingless grasshopper, *Hadenæcus subterraneus*, Scudder, found in Mammoth Cave; other forms of this family occur in caverns.)

*Panorpa*.

*Neuroptera* (Fig. 23, Forceps tail, *Panorpa*; Fig. 24, *Mantispa*) have the mouth parts free again, the wings large and

Fig. 24.

*Mantispa.*

net-veined, the hind pair being often larger than the primaries. Their bodies are more elongated than those of other insects. The metamorphosis is incomplete, the larvæ and pupæ closely resemble the imagoes, and are both active, and with few exceptions they are all aquatic. The different species present strong analogies to all of the

other suborders. The wingless, lower genera present more analogies than other insects to the Myriopods.

The order of *Arachnida* is divided into three suborders:—

✓ *Araneina*, or spiders, which pass through no metamorphosis.

*Pedipalpi*, or harvest-men (*Phalangium*) and scorpions, which undergo no metamorphosis, and all agree in having the maxillary palpi enlarged and ending in a forceps, with the abdomen distinctly jointed, and the

*Acarina*, or mites, the young of which are usually born with but three pairs of feet, and in which the body is oval.

The order of *Myriopoda* is divided into the *Chilopoda*, of which the centipede is a type. In these each ring bears but a single pair of feet, and the body is flattened; while in the second division, the

*Chilognatha*, the body is cylindrical, and each segment appears to bear two pairs of legs. Of this group the thousand legs (*Julus*) is a type.

#### SPECIAL DIRECTIONS FOR COLLECTING INSECTS.

We now proceed to give more special directions for collecting and preserving insects of the different groups.

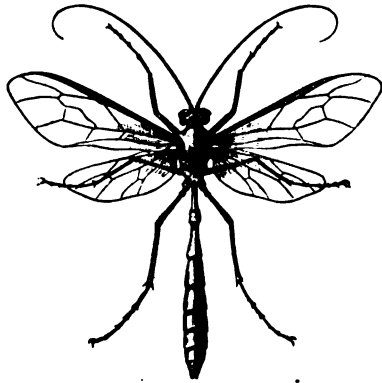


## HYMENOPTERA.

## BEES, WASPS, ICHNEUMON FLIES, GALL FLIES AND SAW FLIES.

These insects are exceedingly abundant, and especial attention should be paid to collecting the smaller species. They should be pinned through the thorax, high up on the pin, and those that are not hairy collected in alcohol. The hairy species of bees should be pinned while in the net. The minute ichneumon flies should be gummed like small beetles upon cards, or preserved in small pill-boxes. The nests of bees, wasps and ants should be sought for and the entire colony with the young grubs captured and placed in spirits, while especial attention should be given to preserving the different sorts of parasites found in the nest. The nests in various stages of construction

Fig. 25.



Ichneumon (Ophion.)

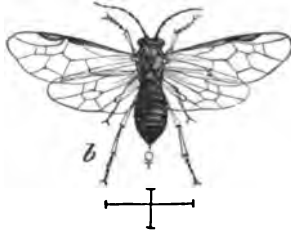
Fig. 26.



Chalcis.



Fig. 27.



Saw Fly and Larva.

should be collected to serve as illustrations of insect architecture.

The gall flies produce by their stings tumors or galls on the leaves or twigs of trees. Specimens of these galls accom-

panied by the insects that produce them are very desirable. They may be reared by simply placing the mature galls in pill-boxes.

The larva of the saw fly (Fig. 27, *a*) closely resembles a caterpillar having several pairs of abdominal legs.

## LEPIDOPTERA.

### BUTTERFLIES AND MOTHS.

Butterflies are easily distinguished from moths by their knobbed antennæ. In the sphinges, or hawk-moths, the feelers are thickened in the middle; in the moths they are filiform and often pectinated like feathers. Lepidoptera have also been divided into three large groups, called Diurnal, Crepuscular and Nocturnal, since butterflies fly in the sunshine alone, most sphinges in the twilight, while the moths are generally night-fliers, though many of them fly in the daytime, thus showing that the distinctions are somewhat artificial.

The larvæ of butterflies and moths are called caterpillars. A good method of preserving larvæ dry, adopted at Dresden,

Fig. 28.



Cabbage Butterfly.

is to squeeze out the intestines through a hole made near the anal extremity of the larva, then to insert a fine straw, after which it may be put in a glass vase, itself placed in a tin vessel and held over a lamp; the larval skin is blown while

suspended over the lamp, by which the skin dries faster. It may be done with a small tube or blow-pipe fixed at the end of a bladder, held under the arm or between the knees, so as to leave the hands at liberty; and the straw which is inserted into the body of the larva may be fastened by a cross-pin stuck through the skin, and thus retained in its proper position throughout the process of blowing. The small larvæ, such as those of the Tineæ, may be put alive into a hot bottle, baked until they swell to the proper extent and dry, when they can be pinned

with all their contents inside. (Westwood, Proceedings of the Entomological Society of London, Sept. 7, 1863.)

Dr. Knaggs has, in the "Entomologist's Monthly Magazine," given some directions for managing caterpillars. Very young caterpillars, which will not eat the food provided, and become restless, should be reared in air-tight jam-pots, the tops of which are covered with green glass to darken the interior of the vessel. When small larvæ hide themselves by mining, entering buds and spinning together leaves, they should have as small a quantity of food as possible. In changing larvæ from one plant to a fresh one, a slight jar or puff of breath will dislodge them, and they can be transferred to the jam-pot; or the glass cylinder, covered at one end with muslin, can be turned muslin end downwards for them to crawl upon. The duplicate breeding cage, pot or tube, should be "sweetened" by a free current of fresh dry air and then stocked with fresh food.

Dr. Knaggs advises that "hiding places," or bits of chips, etc., be provided for such Noctuid larvæ as naturally lie concealed, such as *Orthosia*, *Xanthia*, *Noctua*, etc., "while for *Agrotis* and a few others a considerable depth of fine earth or sand is necessary."

"Larvæ, which in nature hibernate, must either be stimulated by warmth and fresh food to feed up unnaturally fast, or else through the winter must be exposed to out-door temperature." For such larvæ as begin to eat before the trees are leaved out, the leaves of evergreens must be provided, pine leaves, chickweed, grasses and mosses. Hibernating, living larvæ must during the winter be kept dry, otherwise the damp seems to hang about their fur, and causes them to be attacked by a white fungus: while smooth larvæ require the natural dampness of the soil. Mr. Greene describes what he calls his "larvarium, viz.: a very large box, say three feet square and about the same in depth filled partly with mould covered with moss." The edges of the top of this box must be smoothly shaved to suit the lid, which is like the frame of a slate, the slate being knocked out. This is then covered with gauze. In a box of this size small branches may be held in bottles of water, and two or three dozen larvæ safely housed. If placed in a cool room, with plenty of air, they will grow almost as large as if in freedom. Mr. Gibson strongly recommends that during the

winter all cages containing larvæ be placed in front of a window facing the east or northeast, so that the inmates may be kept as cool as possible.

When the moth is fairly out of the pupa, as remarked by Mr. Sanborn, their wings often fail to properly expand, on account of the want of moisture, "the insect being unable to expand its wings in a heated, dry room. He has avoided this difficulty by placing the insect just emerged, or about to come forth, beneath a bell-glass, within which he had placed moistened pieces of bibulous paper."

By taking advantage of the habit of many tree-feeding caterpillars of changing to pupæ (pupating) in the soil close to the trunk of the tree, many rare moths can with little trouble be raised from the chrysalides thus found. As the Rev. Joseph

Greene (*The Insect Hunter's Companion*, London, 1870) advises, the dirt around the trunk should be dug up with a trowel, and carefully examined for chrysalides. He adds that "pupæ may be found almost anywhere and everywhere, under moss on large stones and bowlders, in the decayed stumps of old trees, behind the loose bark on palings, between dead leaves, under moss on banks, etc., etc."



In studying the interesting family of *Tineidæ* (Fig. 29), Stainton remarks that "the elongated wings, the slender body and the long or very long fringes to the wings, are characters by which the *Tineidæ* may generally be recognized at once; and the development of the palpi and their variety in form and structure, offer most tangible grounds for separating the greater number of the genera. Indeed, if the student will look at the head of a species to see whether it is hairy or smooth, if he will then notice the palpi, whether the maxillary palpi are developed and to what extent, and whether the labial palpi are slender, ascending or drooping, whether the second joint is densely clothed with scales, or bears a long protruding tuft, and if he will farther notice the form of the hind wings, which are either well rounded or very pointed, or indented towards the tip, he will be perfectly surprised to see

how easily he will arrange these insects into genera by their structure."

The larvæ vary excessively in the number of legs, sixteen being the usual number, but in several genera (*Gracilaria*, *Lithocolletis*, etc.), we only find fourteen; in *Nepticula*, though the legs are but poorly developed, they number eighteen; on the other hand the larvæ of a few of the smaller genera (*Antispila*, *Tinagma*, etc.) are absolutely footless.

For collecting and preserving these minute and delicate moths, which are called by collectors, *Micro-lepidoptera*, special instructions are necessary. When the moth is taken in the net, it can be blown by the breath into the bottom. "Then by elevating the hand through the ring, or on a level with it, a common cupping glass of about two inches in diameter, or a wine glass carried in the pocket, is placed on top of the left hand over the constricted portion, the grasp relaxed, and the insect permitted to escape through the opening into its interior. The glass is then closed below by the left hand on the outside of the net, and may be transferred to the top of the collecting box, when it can be quieted by chloroform" (Clemens); or the moths may be collected in pill-boxes, and then carried home and opened into a larger box filled with fumes of ether or benzine or cyanide of potassium. In pinching any moths on the thorax, as is sometimes done, the form of that region is invariably distorted, and many of the scales removed. In searching for "Micros" we must look carefully on the *lee side* of trees, fences, hedges and undulations in the ground, for they avoid the wind. Indeed, we can take advantage of this habit of many Micros, and by blowing vigorously on the trunks of trees start the moth off into the net so placed as to intercept it. This method is most productive, C. G. Barrett states, in the "Entomologist's Monthly Magazine," while a steady wind is blowing.

In seeking for the larvæ we must remember that most of them are leaf miners, and their burrows are detected by the waved, brown, withered lines on the surface of leaves, and their "*frass*" or excrement, thrown out at one end. Some are found between united leaves, of which the upper is crumpled. Others construct portable cases which they draw about the trunks of trees, fences, etc. Others burrow in the stems of grass, or in

fungi, toadstools and in the pith of currant or raspberry bushes. Most are solitary, a few gregarious. A bush stripped of its leaves and covered with webs, if not done by *Clisiocampa* (the American tent caterpillar), will witness the work of a *Tortrix* or Tineid. Buds of unfolded herbs suffer from their attacks, such as the heads of composite flowers which are drawn together and consumed by the larvæ.

After some practice in rearing larvæ it will be found easier and more profitable to search for the leaf miners, and rear the perfect, fresh and uninjured moths from them. In this way many species never found in the perfect state can be secured.\*

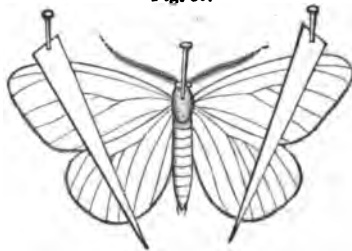
In raising "*Micro*" larvæ it is essential that the leaf in which they mine be preserved fresh for a long time. Thus a glass jar, tumbler or jam-pot, the top of which has been ground to receive an air-tight glass cover, and the bottom covered with moist white sand, will keep a leaf fresh for a week, and thus a larva in the summer will have to be fed but two or three times before it changes; and the moth can be seen through the glass without taking off the cover; or a glass cylinder can be placed over a plant inserted in wet sand, having the top covered with gauze. Dr. H. G. Knaggs, in treating of the management of caterpillars in breeding boxes, enumerates the diseases, besides muscardine and cholerine (and we might add pebrine) to which they are subject. Among direct injuries are wounds and bruises, which may be productive of deformities in the future imago; the stings of ichneumon flies, whose eggs laid either upon or in the body may be crushed with finely pointed scissors or pliers; frost bites; and suffocation, chiefly from drowning. If the caterpillar has not been more than ten or twelve hours in the water it may be recovered by being dried on a piece of blotting paper and exposed to the sun. Larvæ may also starve to death, even when food is abundant, from loss of appetite, or improper ventilation, light, etc.; or they may eat too much, become dropsical and die. Caterpillars undoubtedly suffer from a contagious disease analogous to low

\* "In general, it may be said, the mines of the leaf miners are characteristic of the genus to which the larva may belong. A single mine once identified, enables the collector to pronounce on the genus of all the species he may find thereafter. This, added to the ease with which the larvæ are collected, and the little subsequent care required to bring them to maturity, except to keep the leaves in a fresh and healthy state, makes the study of this group, in every respect, pleasant and satisfactory to the entomologist." (Clemens.)

fever. Many die while moulting, especially the larvæ of butterflies, sphinges and bombycids; others are carried off by diarrhœa, which is generally caused by improper feeding on too juicy or relaxing food, when oak leaves or dry stunted foliage should be given them. To relieve constipation they should be fed with lettuce and other natural purgatives, and lastly, they may be attacked by fungi, especially, besides those previously mentioned, a species of *Oidium*. Such patients should be put in direct sunlight or dry currents of air. (Entomologist's Monthly Magazine, June, 1868.) The pupæ easily dry up; they should be kept moist, in tubes of glass closed at either end, through which the moth can be seen when disclosed.

In setting *Micro-lepidoptera*: "If the insect is *very small* I hold it by its legs between the thumb and finger of the left hand, whilst I pierce it with the pin held between the thumb and finger of the right hand;

Fig. 30.



if the insect is not very small I use a rough surface, as a piece of blotting paper, or piece of cloth, for it to lie upon and prevent its slipping about, and then cautiously insert the point of the pin in the middle of the thorax, as nearly as possible in a vertical direction. As soon as the pin is fairly through the insect, remove it to a piece of soft cork, and by pressing it in, push the insect as far up the pin as is required.

"For setting the insects I find nothing answers as well as a piece of soft cork, papered with smooth paper, and with grooves cut to admit the bodies. The wings are placed in the required position by the setting needle, and are then retained in their places by a wedge-shaped, thin paper brace (Fig. 30), placed over them till a square brace of smooth card-board is placed over the ends of the wings." (Stainton.) A small square of glass can also be laid on the wings to keep them expanded, and thus serve the same purpose as the paper braces.

Linnæus first set the example of having the specific names of the Tortricids end in *ana* and of the Tineids in *ella*, and at the present day the rule is generally followed by entomologists,

who have also given the same terminations to the names of the smaller species of *Pyralides*, such as *Pempelia*, *Crambus* and allied genera.

We may also add Lord Walsingham's directions for collecting *Micro-lepidoptera*, published in the "American Naturalist" (Vol. vi, No. 5.)

"I go out with a coat provided with large pockets inside and out, containing an assortment of pill-boxes, generally of three sizes, glass bottomed pill-boxes preferred, a bag slung over my shoulder, and a net. Unless searching for particular day flying species I prefer the last three hours before dark. As the sun goes down many species move which do not stir at other times. I watch the tops of the grass, the stems of the flowers, the twigs of the trees; I disturb leaves and low growing plants with a short switch and secure each little moth that moves, taking each out of the net in a separate pill-box, selected according to the size of the insect, as he runs up the net to escape. Transferring the full boxes to the bag I continue the process until moths cease flying or night sets in. Many species can be taken with a lamp after dark.

"Returning to camp I put a few drops of liquid ammonia on a small piece of sponge and place it in a tin canister with such of the boxes as do not contain the smallest species, and put these and the remainder away until morning in a cool place. In the morning I prepare for work by getting out a pair of scissors, a pair of forceps, my drying box containing setting boards, a sheet of white paper and some pins.

"First, I cut two or three narrow pieces of paper from three to six lines wide, or rather wider, according to the size of the largest and smallest specimens I have to set. I then double each of these strips and cut it up into braces by a number of oblique cuts. Now I turn out the contents of the canister and damp the sponge with a few drops of fresh ammonia, refilling with boxes containing live insects. Those which have been taken out will be found to be all dead and in a beautifully relaxed condition for setting. Had the smallest specimens been placed in the canister over night, there would have been some fear of their drying up, owing to the small amount of moisture in their bodies.

"If the weather is very hot there is some danger of killed



insects becoming stiff while others are being set, in which case it is better to pin at once into a damp cork box all that have been taken out of the canister, but under ordinary circumstances I prefer to pin them one by one as I set them.

"Taking the lid off a box, and taking the box between the finger and thumb of the right hand, I roll out the insect on the top of the left thumb, supporting it with the top of the fore finger and so manipulating it as to bring the head pointing towards my right hand and the thorax uppermost. Now I take a pin in the right hand and resting the first joint of the middle finger of the right against the projecting point of the middle finger of the left hand to avoid unsteadiness, I pin the insect obliquely through the thickest part of the thorax so that the head of the pin leans very slightly forward over the head of the insect. After passing the pin far enough through to bring about one-fourth of an inch out below,\* I pin the insect into the middle of the groove of a setting-board so that the edge of the groove will just support the under sides of the wings close up to the body when they are raised upon it. The board should be chosen of such a size as will permit of the extension of the wings nearly to its outer edge. The position of the pin should still be slanting a little forward. The wings should now be raised into the position in which they are intended to rest, with especial care in doing so not to remove any scales from the surface or cilia of the wings. Each wing should be fastened with a brace long enough to extend across both, the braces being pinned at the thick end, so that the head of the pin slopes away from the point of the brace; this causes the braces to press more firmly down on the wing when fixed. The insect should be braced thus: the two braces next the body should have the points upwards, the two outer ones pointing downwards and slightly inwards towards the body, and covering the main portion of the wings beyond the middle. Antennæ should be carefully laid back above the wings, and braces should lie flat, exercising an even pressure at all points of their surface. The fore wings should slope slightly forwards so that a line drawn from the point of one to the point of the

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\* The English mode of pinning low down on a short pin presents so many disadvantages that we would caution collectors to pin high up on a long pin so that three-fourths of its length should project below the body.—*Editor*.

other will just miss the head and palpi. The hind wings should be close up, leaving no intervening space, but just showing the upper angle of the wing evenly on each side. I can give no more precise directions as to how this desirable result may most simply and speedily be attained; no two people set alike. Speed is an object; for I have often had to set twelve dozen insects before breakfast. A simple process is essential, for a man who is always pinning and moving pins, and rearranging wings and legs, is sure to remove a certain number of scales and spoil the appearance of the insect, besides utterly destroying its value. I raise each of the fore wings with a pin and fix the pin against the inner margin so as to keep them in position while I apply the braces. Half the battle is really in the pinning. When an insect is pinned through the exact centre of the thorax with the pin properly sloped forward, the body appears to fall naturally into its position on the setting-board, and the muscles of the wings being left free are easily directed and secured: but if the pin is not put exactly in the middle, it interferes with the play of the wings. Legs must be placed close against the body or they will project and interfere with the set of the wings. Practice, care and a steady hand, will succeed. When all the insects that have been killed are set, the contents of the canister will be found again ready, twenty minutes being amply sufficient to expose to the fumes of ammonia. Very bright green or pale pink insects should be killed by some other process, say chloroform, as ammonia will affect their colors.

"Insects should be left on the setting-boards a full week to dry; then the braces may be carefully removed and they may be transferred to the store box.

"Having given some account of the process each insect goes through, I will say a word as to the apparatus required.

"First as to nets. The simplest net is a strong, circular, iron wire hoop with a bag of book muslin attached, fastened into a light deal or other handle.

"I use a small pocket net about nine inches in diameter made to fold up, with a jointed wire frame and a screw to fit into a brass socket in a short cane handle. To counteract the strain of the net upon so slight a frame the three wire joints are made flat, the two side joints flattened across the strain, the upper one the reverse way; but to prevent this upper joint from

coming into play when the net is fixed, the upper part of the screw which holds the frame to the handle is welded square and fits a corresponding square socket in the other end of the wire frame, holding all tight when screwed down. A small green silk or other net can be slipped on or off this frame as required.

"An umbrella net with stout steel rim and canvas edging is useful for sweeping tall grass and herbage, or to beat branches into, by which means many small and beautiful species of retired habits may be obtained.

"I use pill-boxes with glass bottoms, which can be obtained of various sizes. They are convenient in admitting of the examination of each specimen, so rare species can be especially searched for, and damaged ones permitted to escape; but they are expensive and for ordinary purposes card-board boxes answer sufficiently well. It is a good plan at the beginning of a season to strengthen all your boxes by a crossed strap of tape or calico firmly glued at the top and bottom. For a killing box any tin box or canister with a closely fitting lid, capable of containing one hundred pill-boxes will be found to answer.

"Setting-boards can be bought ready made of the smallest sizes. They are made by gluing a strip of thick cork on a thin slip of deal; the cork must be thick enough to enable a groove to be cut into it, deep enough to hold the bodies of the insects to be set, and to leave sufficient depth for the pin to hold firmly without reaching the deal. The cork on each side of the groove should be smoothed off with a gentle curve, so that the wings dry in a good position. The deal backing projects beyond the cork so as to slide into a groove if required, and it is convenient to have a deal cupboard of drying boxes with handle at top and perforated zinc door, having grooves on each side into which the setting boards can be slid. Each board should be papered with thin white paper.

"At the beginning of a season setting-boards may be washed or brushed over with advantage with a weak solution of oxide of zinc; it fills up old pinholes and makes them look clean.

"For *Tortricina* use No. 10 pins; for *Tineina* (small), No. 19; for *Nepticulæ*, No. 20.

"Always set your insects as soon as you kill them, they are then much more easy to set and retain their position better when dry.

"When pill-boxes are filled keep them cool to prevent the insects from fluttering; if glass boxes, keep them also in the dark.

"Many species when first taken will flutter in the boxes and injure themselves; for these it is well when collecting to carry a small phial of chloroform and a zinc collecting box cork-lined, into which you can at once pin your captures; the cork should be damped to keep them fresh. Touching a pill-box with a finger moistened with chloroform will kill the insect inside. Too much chloroform is apt to stiffen the nerves of the wings and interfere with setting.

"By breeding *Microlepidoptera*, many species not otherwise easily obtainable may be added to a collection, and the habits of others in the larva state may be studied with much interest. For this purpose a few wide-mouthed glass bottles should be obtained with corks to fit, so that the small larvæ can be placed in them with fresh food and the food kept fresh by exclusion of air. If mould should appear the cork can be replaced by muslin or net tied over. I would hardly advise a travelling collector to attempt this method although I have adopted it with some success, but in a stationary camp it is most interesting and comparatively easy.

"Cork-lined store boxes are of course required into which to remove the insects when sufficiently dried on the setting boards. These, as well as the pins and setting-boards with drying case to hold them, and the net frames of the folding and umbrella patterns, will be best obtained from some dealer in such things.\*

"To pack *Microlepidoptera* for travelling, pin them firmly close together into a cork-lined box, so that each specimen just gently holds down the body of the one above it. This cannot be done with very minute species. Put your box into another larger box and let the outer one be sufficiently large to leave a good clear six inches all around the inner one. Pack this in-

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\*In London there are several, among whom I would mention T. Cook, New Oxford Street, and Thomas Eedle, Maidstone Place, Hackney Row. The manufacturers of entomological pins, which can, however, be obtained from the above dealers, are Messrs. Eddleston & Williams, Birmingham; Messrs. Kirby & Beard, Canon Street, London. In America, The Naturalists' Agency, Salem, Mass., and C. G. Brewster & Co., Washington St., Boston, keep on hand insect pins, cork, pill-boxes, and most of the other articles required by the collector.

tervening space with hay not crammed too tight; it will act as a spring and reduce the effect of shaking; the whole parcel should be made thoroughly secure against damp."

## DIPTERA.

## FLIES, MOSQUITOES, BOT FLIES, ETC.

There are about 2,500 species of North American flies described, and it is probable that the number of living North American species amounts to 10,000. In Europe there are also about 10,000 known species, belonging to about 680 genera.



Black Fly.

The flies of this country, compared with the other groups, have been but little studied, though the habits of many are so interesting and the species very numerous. The different parts of the body vary much more than in the Hymenoptera and Lepidoptera, and in such a degree as often to afford comparatively easy characters for discriminating the genera.

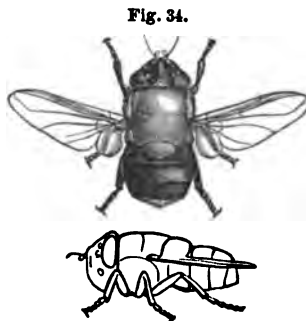


Syrphus Fly.

Their habits are very variable. Fresh water aquaria are



Tachina Fly.



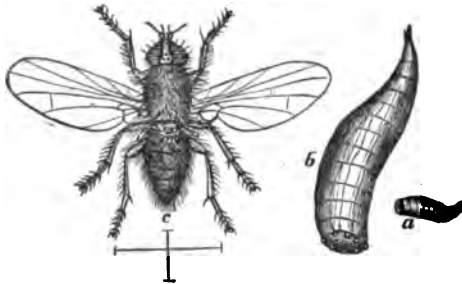
Bot Fly.

necessary for the maintenance of aquatic larvæ. If quantities of swamp mud and moss with decaying matter are kept in

boxes and jars, multitudes of small flies will be hatched out. Leaf-mining and seed-inhabiting species can be treated as *Microlepidoptera*, and earth-inhabiting larvæ like ordinary caterpillars. Dung, mould in hollow trees, stems of plants and toadstools, contain numerous larvæ or maggots (Fig. 35) as the young of flies are called, which must be kept in damp boxes.

Flies can be pinned alive, without killing them by pressure, which destroys their form; and numbers may be killed at once by moistening the bottom of the collecting box with creosote, benzine or ether, or putting them into a bottle with a wide mouth, containing cyanide of potassium. Minute species can be pinned with very slender pins, or pieces of fine silver wire, and stuck into pieces of pith, which can be placed high up on

Fig. 35.



Onion Fly and Maggot.

a large pin. In pinning long-legged, slender species, it is advisable to run a piece of card or paper up under their bodies upon which their legs may rest, and thus prevent their loss by breakage. Of these insects, as of all others, duplicates in all stages of growth should be preserved in alcohol, while the minute species dry up unless put in spirits.

## COLEOPTERA.

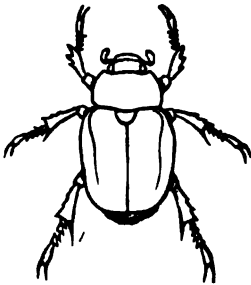
### BETLES.

"Coleopterous insects may be distinguished by the hard shell which incases their bodies; the wings are protected by horny wing covers, but in some the wing covers are small.

It is through the right wing cover (Fig. 9) that they should be pinned for the cabinet. They are found in every variety of situation ; on plants, in decomposing animal and vegetable matter, in mushrooms, under bark of trees, under stones, especially in moist and shady situations ; many are found creeping on the ground, in deserts and other arid spots in western America ; some are attracted by candles at night, while others (in all parts of the country) fly actively on being approached and light again on the ground a few paces off.

"Many peculiar species, not found in other situations, live under material cast up by the ocean ; others are found along

Fig. 36.



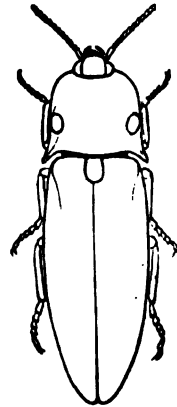
Goldsmith Beetle.

Fig. 57.



Tiger Beetle.

Fig. 38.



Fire Fly.

the shores of lakes and rivers ; many also are found living in the water." (Leconte.)

Mr. Edward Newman says that "moss is a great resort of beetles in the winter ; whenever you have the opportunity go into the thickest woods, and pulling up the moss by handfuls cram it into a canvas bag, which you have taken with you for this especial object. Then on a winter's day, when nothing tempts you abroad, shake out your moss, bit by bit, on a white cloth, and you will soon possess yourself of wonders."

"A large number of species are very minute, and are usually found in abundance ; these should not be neglected, as to scientific men they possess quite as much interest as the larger species. The specimens should be thrown into strong alcohol ;

if this cannot be procured, common whiskey will answer very well, but must, when the specimens are numerous, be replaced by fresh liquor. The smaller specimens should be kept in a separate bottle. When the bottle is full, the liquor should be poured off and replaced by fresh alcohol or whiskey, and closely corked. If there is much danger of breaking in transportation, the specimens, after being well soaked with the alcohol, may be allowed to dry partially, but not so as to become brittle, and then packed in small pasteboard boxes, taking care, by shaking the box well before finally closing it, to pack the specimens so closely that they cannot be broken by moving about; the box may then be closed by pasting a small strip of paper around it, and the locality, date of collection, etc., written on the top." (Leconte.)

We copy from a chapter on collecting Coleoptera, by Edward Newman, in Greene's "Insect Hunter's Companion" (London, 1870), an account of Mr. Crotch's plan of killing and preserving beetles, of especial use while on a long journey.

"The following method has now been in use some time, and hence has been fairly tested. Its advantages are very great, so that I make no apology for introducing it to the notice of your readers. The first idea of the process is due, as far as I know, to M. de Vuille-froi, who used it with me in Spain, some years ago, with great success. The specimens may be collected in two ways, according to the size and the convenience of the collector. The first and best way, for small species, is by putting them into a bottle containing about half an inch of dry pine-sawdust, in which has been previously placed a small piece of cyanide of potassium about as big as a pea: they will then die instantly. Larger species and small species which do not fly readily, may be put into spirits in the ordinary way, but the *Staphylinidæ* and others generally open their wings in this process. The sawdust should be pine-wood and sifted free from chips on the one hand and from dust on the other, so as to be of an uniform size. For storing the species thus collected, a few tin canisters will be found most convenient; a layer of sawdust is placed at the bottom, and then beetles and so on alternately to the top. The sawdust used in the tins should be damped (not *wetted*) with a mixture of spirit and one-twentieth part of carbolic acid, which will



effectually prevent mould or mites and will bring the specimens home perfectly fresh and clean. Small species, or specimens from a particular locality, should be wrapped in a piece of rag or tissue-paper, with a little sawdust, and the name of the locality. The specimens collected in spirits should be removed as soon as possible (in a few days at farthest), and transferred to sawdust. When the tins are full, some more spirit and carbolic acid should be poured in and the top soldered down: they will then keep for two years at least. The advantages of this method are manifest, especially in the absence of any danger of breakage or leakage; and it is more than probable that a similar plan might be employed with reptiles, fishes, etc., but for these chloride of zinc suggests itself as the agent most likely to be of service. As the insects do not become rotten by the above process, it is sometimes not so easy to set their legs in the peculiar manner in vogue in this country, but they will have as a set-off the advantage of being thoroughly fit for study. When by any chance spirit cannot be obtained, they will keep perfectly in dry sawdust, if the specimens are dried in the air for a few hours first; all that is necessary afterwards being to relax them in the sawdust instead of removing them from it. Jars or wide-mouthed pickle bottles may of course be used instead of tins, and are more airtight, but liable to break."

"That eminent and most excellent entomologist, Mr. E. W. Janson, endorses Mr. Crotch's recommendation, and adds a few hints on the subject of collecting beetles abroad, as follows:—

"The sawdust plan, now almost universally adopted by collectors, I can recommend both on account of its simplicity and efficiency. The sawdust should be that of some white or yellow wood without coloring matter—pine is perhaps the best; it should be sifted over fine muslin, and the dust and minute particles rejected. In collecting, wide-mouthed bottles should be used; these should be about one-fourth filled with dry sawdust, adding beneath a piece of cyanide of potassium of the size of a large pea or haricot bean. On reaching home after collecting, the contents of the collecting bottles should be shaken out on a large sheet of paper, and the insects transferred to the stock-bottle or jar, and the cyanide and sawdust

returned to the collecting bottles for future use. Any description of wide-mouthed bottles, such as pickle-jars, may be used as stock bottles; they should, however, have tightly-fitting corks or bungs. Before putting the insects collected into the stock bottle, throw into it sawdust a quarter of an inch in thickness, *slightly damped*, not *moistened*, with a mixture made of alcohol (methylated spirit will answer admirably; brandy or strong whiskey, if unsweetened, will suffice, but sweetened gin and rum must be avoided), or, still better, benzine or benzoline, and carbolic or phenic acid. These should be mixed in the proportions of nineteen parts of alcohol or benzine and, one part of carbolic acid. On the sawdust damped with this mixture place a layer of insects; over them a second stratum of damped sawdust, then a second layer of insects, and so on alternately until the stock-bottle or jar is filled; take care that it is always kept well-closed. When it is filled it may be packed with any other objects in sawdust, hay, moss, or any other elastic substance, and forwarded to its destination.’’

Special attention should be given to the collection of the larvæ of beetles, called grubs. They are found in soil, under the bark of trees, in nuts, etc., and in fresh water pools.

## HEMIPTERA.

### BUGS, PLANT LICE, BARK LICE, LICE.

This group of insects has been greatly neglected, as they are not the favorites of entomologists. By sweeping grass

Fig. 39.

*Stiretrus.*

Fig. 40.

*Arma.*

Fig. 41.

*Thrips.*

and herbage, as for beetles, in the latter part of summer, large numbers occur which can only be obtained in this way. Hi-

bernating species are found under leaves in hard-wood forests. The large carnivorous kinds are sometimes found on bushes with caterpillars transfixed on their jaws. Aquatic species should be taken out by the water-net by thrusting it suddenly under surface swimming species, or by pushing it among submerged grass or weeds where the smaller forms may be lurking; several kinds occur under submerged logs, sticks, etc.

The soft-bodied species of *Aphis* or plant lice should be preserved in alcohol, glycerine or Canada balsam. They should be carefully watched for their parasites, and can be easily kept in slender glass vials through which they can be watched.

Fig. 42.



All the bugs should be pinned through the distinct triangular scutellum situated in the middle at the base of the wings (Fig. 42). The small hard species of leaf hoppers should be pinned through the right wing cover. Birds and various quadrupeds should be carefully examined for lice which may be preserved in alcohol.

## ORTHOPTERA.

### GRASSHOPPERS.

Orthoptera can be easily preserved in strong alcohol, and may afterwards be taken out and pinned and set at leisure. If preserved dry they can be killed with cyanide of potassium, or ether, without losing their colors, as they would do after remaining long in alcohol. They should be pinned through a little triangular spot between the bases of the elytra, or fore wings, when the wings can be spread to advantage. They are also often pinned through the right elytron, as in Coleoptera. In pinning these insects for transportation care should be taken to put in additional pins crossing each other on each side of the abdomen, and in like manner to steady the hind legs, which are very apt to fall off if too much jarred.

## NEUROPTERA.

## DRAGON FLIES, MAY FLIES, CADDIS FLIES, ETC.

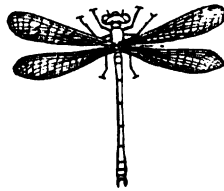
These insects, the young of which frequently live in fresh water ponds and streams, should be pinned through the centre of the thorax, the smaller and more delicate kinds immediately on capture should be pinned in the collecting box.

The Psoci (Fig. 45, *Cecilius*) live on leaves and the bark

Fig. 43.

*Libellula* (Dragon Fly).

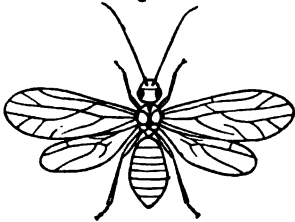
Fig. 44.

*Agrion*.

of trees, and are more or less social. They closely resemble the *Aphis*.

As regards the preservation of the dragon flies, Mr. Uhler states that "the large, brilliant green dragon flies (*Cordulina*), as well as the yellow, brown-striped *Gomphina*, having the

Fig. 45.

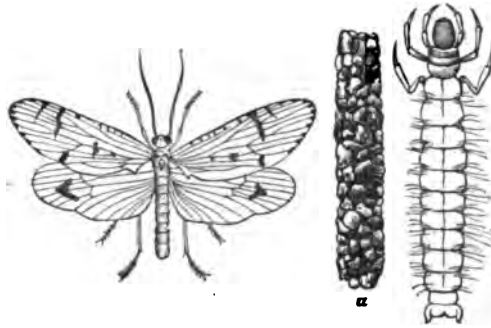
*Cecilius*.

eyes wide apart, will furnish new species in almost all parts of the country. In order to preserve specimens in the neatest manner it is well to slip them immediately, when caught, into paper bags of suitable size; first taking care to lay back the wings so that they will be applied together, to prevent

mutilation. These paper bags may be placed loosely in a box carried for the purpose. They can thus be taken out at leisure, killed by applying a camel's hair pencil, dipped in sulphuric ether, chloroform, or benzine, to the under side of the body, and then have the wings spread by placing them upon the setting boards. In most species the colors change after death,

hence it is important to make short descriptions of the colors before killing the specimens." The smaller, more slender and delicate Neuroptera should be pinned directly in the collecting box. Many species are caught by a light in the night time, such as *Polystoechotes nebulosus* and the Caddis flies (Fig. 46,

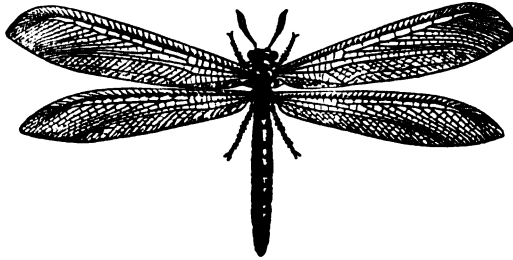
Fig. 46.



Caddis Fly and Larva and its Case.

*Neuronia semifasciata*) ; and a bright light placed in damp situations by streams, etc., will attract large numbers, the smaller species, like moths, being attracted a great distance by light. Other species of this group, so numerous in the northern states, are found in great numbers floating on lakes and ponds. For

Fig. 47.



Ant-lion, adult.

the proper study of the genera of these insects, and often of the species, they should be collected in alcohol, so as to be studied in a flexible state.

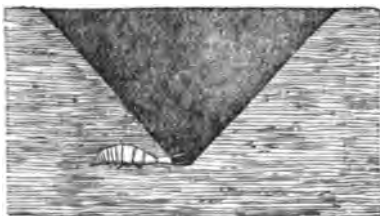
The aquatic larvæ and pupæ can be reared in aquaria in jars and tumblers, taking care that the weaker species are sepa-

rated from those more powerful and bloodthirsty. The little Entomostraca, or water fleas serve as food for the smaller species. With care many species can be reared in this way, and so little is known of their transformations that figures and descriptions would be of great value. The interesting and varied habits of the different families can also easily be noted.

The Ant-lions (Fig. 47) in the larva state (Fig. 48) dig pit-



Fig. 48.

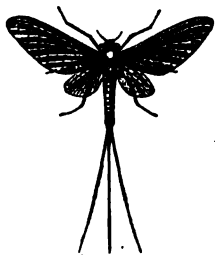


Ant-lion.

falls in the sand. The adults may be preserved in the same manner as Dragon flies.

The May flies, or Ephemerids (Fig. 49), as their name implies, are, when fully grown, very short-lived insects, the adult living but a few hours. The body is slender and weak, being very

Fig. 49.



May Fly.

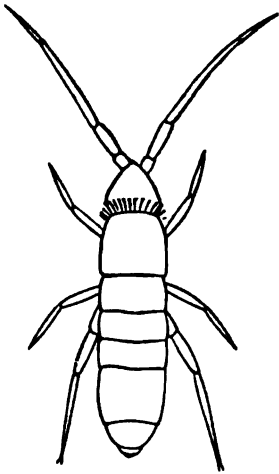
long; the prothorax is of moderate size; the antennæ are subulate, awl-like, being very small, as in the dragon flies, while the parts of the mouth are rudimentary, the insect taking no food in the adult or imago state. The wings are very unequal in size, the hinder pair being much smaller, or in some instances (*Chloë* and *Cænis*) entirely aborted; the transverse veins are either few or numerous; the tarsi are four or five jointed,

and appended to the long, slender abdomen are two or three long caudal filaments.

The sexes unite while on the upper surface of the water, and after a short union the female drops in the water her eggs "in two long, cylindrical yellow masses, each consisting of numerous minute eggs." Walsh states that he possesses a "sub-imago of *Palingenia bilineata*, which oviposited in that state."

The larvæ live in running water and prey on small aquatic insects, the body being long and flat, with long hair-like antennæ, and small eyes situated on the side of the head, the ocelli not usually being present, and long sickle-shaped jaws, while along each side of the abdomen are leaf-like or bushy false gills, and the body ends in long feathered anal hairs. They live, it is stated, two or three years, and reside in burrows in the mud, under stones, or among grass and weeds, where they may be taken with the water-net in great abundance, and are beautiful

Fig. 52.

Podura (*Tomocerus*).

objects for the aquarium. Lubbock states that *Chloëon* passes through twenty-one moultings of the skin before it assumes the imago state; the pupæ are active and have, as a general rule, the rudiments of wings. After leaving the pupa skin the insect (sub-imago), when its wings are expanded, takes a short flight, and then casts another skin before reaching the

final imago state. They often fly in immense numbers, and become stranded in winrows along the borders of lakes. The perfect insects should be preserved in alcohol for study, as they shrivel up when pinned. They should be described when alive if possible.

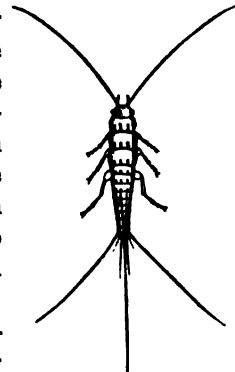
The *Thysanura*, comprising the *Lepisma* (Fig. 51, *Lepisma 4-seriata* or Bristle Tail, and *Podura* or Spring Tail; Fig. 52, *Tomocerus plumbeus*) are found abundantly in damp

Fig. 50.



Ephemera larva.

Fig. 51.

*Lepisma 4-seriata*.

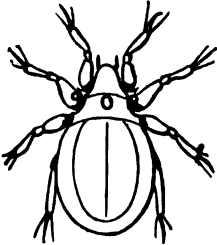
apartments, or in moist dark places under sticks, stones, among fallen leaves, or under bark of trees, while some occur in great profusion about manure heaps and hot-beds in early spring. They should be collected in a mixture of alcohol and glycerine, equal parts, or alcohol alone. Collections from the western and Pacific states are very desirable.

## ARACHNIDA.

### SPIDERS, SCORPIONS AND MITES.

In studying spiders, of which there are in New England

Fig. 53.



Nothrus Mite.

alone, according to Mr. Emerton, over two hundred species, the number and relative situation of the eyes, and the relative length of the different pairs of legs, should be noticed. Their webs and the manner of constructing them; their habitats, whether spreading their webs upon or in the ground, or in trees, or on herbage; or whether the species is aquatic, or erratic, and pursue their prey without building

webs to entrap them, should be observed. So, also, how they deposit their eggs, and the form and appearance of the silken nidus, and whether the female bears her eggs about her, and how this is done, whether holding on to the egg-sac by her fore or hind legs, should all be carefully noticed. Care must be taken not to mistake the young or full-grown, mature species, and describe them as such. Spiders can be reared in boxes as insects. The only way to preserve them is to throw them into alcohol; when pinned, they shrivel up and lose their colors, which keep well in spirits.

The colors of spiders vary much at different seasons of the

Fig. 54.



Cattle Tick.



year, especially during the frosts of autumn, when the changes produced are greatest. All spiders are directly beneficial to agriculture by their carnivorous habits, as they all prey upon insects, and do no harm to vegetation. Their instincts are wonderful, and their habits and organization worthy of more study than has yet been paid them. We have no species poisonous to man, except when the state of health renders the constitution open to receive injury from their bite, just as mosquitoes and black flies often cause serious harm to some persons.

The mites (Fig. 53, *Nothrus*) occur under bark, sticks, stones, or on the bodies of birds and mammals or insects. They should be preserved in alcohol.

All kinds of Ticks (*Ixodes*, Fig. 54) should also be preserved in spirits, as well as the minute species of mites which occur everywhere.

## MYRIOPODA.

### CENTIPEDS, THOUSAND LEGS, MILLEPEDS.

The centipeds and millepeds (Fig. 55, *Julus multistriatus*) live in damp situations under stones, sticks, leaves, etc. They should be preserved in different stages of growth in spirits. Several species (*Spirostrephon*) live in caves and should be especially sought for.

Fig. 55.



Julus.

In conclusion we may say that while the Coleoptera, Lepidoptera, and Hymenoptera of the north-eastern states of the union are comparatively well known, specimens of all orders from the southern and western states, the Pacific states, and the great plains, *however common*, are eagerly desired, as well as all cave insects. Specimens received by the Smithsonian Institution will be forwarded to experts for identification and description. Specimens should always be accompanied by small paper labels attached to the pin or placed in the bottles. If written in pencil on heavy paper the marks will endure for a long time. Always state the locality and date of capture.



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SMITHSONIAN MISCELLANEOUS COLLECTIONS.

264

NEW SPECIES

OF

NORTH AMERICAN COLEOPTERA.

PREPARED FOR THE SMITHSONIAN INSTITUTION.

BY

JOHN L. LECONTE, M.D.

PART II.



WASHINGTON:  
SMITHSONIAN INSTITUTION:

MAY—JUNE, 1872.



**ASEMUM** Esch.

**482. *A. nitidum*.** *Atrum nitidum*, breviter fusco-pubescent, prothorace latitudine brevior, lateribus valde rotundatis, disco subtiliter minus dense punctato, ante basin transversim, disco autem vix conspicue impresso; elytris subtiliter dense punctulatis, obsolete striatis. Long. 17.5 mm.

One male, Oregon, Lord Walsingham. This species is larger, and somewhat more robust than either *moestum* or *atrum*, and is easily known by the surface being lustrous instead of opaque, and by the prothorax being much less densely punctured. The antennæ of the male are half as long as the body and stouter than in the other species, especially towards the base. The eyes are of the same form, and somewhat hairy as in the other species.

*Asemum asperum* Lec. belongs properly to *Nothorhina*, a genus easily distinguished by the prosternum being more deeply emarginate in front, pronotum longitudinally excavated in the middle, and rough with elevated points at the sides.

**CRIOCEPHALUS** Muls.

"The vaguely described North American species introduced by Kirby, Randall, and Leconte," do not seem to have merited the recognition of Schiödte,\* and I have therefore constructed the following table, which may assist in the determination of specimens.

Some of the characters used by Prof. Schiödte for the separation of the two Danish species, become, in our more extensive fauna, of importance in defining groups rather than individual species, which may accordingly be divided as follows:—

A. 3d joint of hind tarsi emarginate for half its length, the 4th joint consequently extending as far as the lobes of the 3d joint, elytra finely punctured:

Antennæ and legs very slender, hind tarsi with the 3d joint twice as long as wide; body more elongate, prothorax not wider than long, rounded on the sides, slightly roughened with elevated points.

1. *PRODUCTUS* Lec.

Antennæ and legs less slender, body less elongate, prothorax wider than long:

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\* *Annals and Magazine of Nat. History*, 3d ser. xv. 233. (March, 1865.)  
12 May, 1873.

- 3d joint of hind tarsi two-thirds longer than wide, prothorax rounded at the sides and slightly roughened. 2. *AGRESTIS* (Kirby).  
 3d joint of hind tarsi half longer than wide, prothorax angulated at the sides, and strongly roughened. 3. *ASPERATUS* Lec.  
 B. 3d joint of hind tarsi bilobed, cleft nearly to the base, the 4th joint received into the emargination, not extending as far as the end of the lobes; elytra less finely punctured, (sides of prothorax rounded, scarcely asperated):  
 Prothorax deeply impressed, hind tarsi with 3d joint nearly twice longer than wide. 4. *MONTANUS*, n. sp.  
 Prothorax feebly impressed, hind tarsi with 3d joint very little longer than wide;  
 Prothorax very finely punctured. 5. *OBSELETUS* (Rand.).  
 Prothorax less finely punctured. 6. *NUBILUS* Lec.  
 C. Eyes smaller, less prominent, and more deeply emarginate than in the other species, prothorax and elytra finely punctured, the former rounded, not asperated, feebly impressed at the middle; 3d joint of hind tarsi . . . . . 7. *AUSTRALIS* Lec.

#### 483. *C. montanus*.

This species is founded on four specimens from Colorado, having very much the appearance of *C. productus*, but differing by the 3d joint of hind tarsi cleft nearly to the base, and by the less finely punctured elytra. The prothorax is scarcely wider than long, rounded on the sides, with only a few elevated points, finely and densely punctured, with the two discoidal impressions, the medial channel, and two tranverse impressions deep. The hind tarsi are slender, the 2d joint is more than twice as long as its width, and the 3d is about half longer than its width, cleft nearly to the base. The antennæ of the ♂ are about three-quarters as long, those of the ♀, one-half as long as the body. The ventral sexual characters are as in the other species, the 5th segment being broad in the ♂, elongate in the ♀; in the ♂ the 6th segment is visible. Length 19–24 mm.

7. *C. australis* Lec., Pr. Ac. Nat. Sci., Phil. 1862, 43; *Asemum australe* Lec., Journ. Ac. Nat. Sci. Phila., 2d ser., ii. 35. I have seen only the type of this species, which on account of the finer punctuation, and general appearance, I placed in *Asemum* from which it differs by the eyes being larger, more coarsely granulated, and not hairy.

**GONOCALLUS** LEC.

Body elongate, slender, thinly pubescent, with long flying hairs on the antennæ, legs, prothorax, body, and elytra; integuments of firmer consistence than usual in the tribe; front short, oblique, channelled, divided by a deep transverse line, support of labrum coriaceous as usual. Eyes finely granulated, deeply emarginate; genæ short, prominent, rectangular. Palpi short, not very unequal, last joint broadly triangular; antennæ slender, thinly clothed with long pubescence, and sparsely villous; scape rather stout, more than half as long as 3d joint, 2d joint about one-fourth as long as 3d joint; 4th joint a little shorter than 5th joint; 11th in ♀ simple, in ♂ very distinctly divided, outer portion shorter. Prothorax shining, sparsely punctured, sides distinctly angulated at the middle. Elytra elongate, densely punctured, rounded at tip. Prosternum narrow between the front coxæ, which are transverse and broadly angulated. Mesosternum triangular, obtusely rounded behind, coxæ distant, open externally; episterna of metathorax not very wide, nearly parallel, tubercle of scent pores very distinct; 5th ventral segment shorter in ♂ and broadly emarginate. Legs slender, thighs very feebly clavate, hind tibiæ with distinct spurs, tarsi shorter than tibiæ, 1st joint as long as the two following united.

A very anomalous genus, founded on *Callidium collare* Kirby (lepidum Lec.), a slender black species with bright red prothorax, found in Canada, and on Lake Superior. By the greater firmness of the tissues, the general appearance, the presence of an additional article in the ♂ antennæ, and the smaller size of the 2d joint, it forms a connecting link with the later tribes allied to Clytini; but by the broadly angulated front coxæ it belongs rather to the Callidiini.

The eyes are more inclined to embrace the base of the antennæ than in any other genus of the Callidioid series, and it is rather to avoid making a new group in the Cerambycoidea than for any other reason that I have placed it here.

**GRACILIA** MULS.

**484. *G. fasciata*.** Nigra opaca, subtiliter pubescens, prothorace latitudine fere duplo longiore, medio paulo latiore, alutaceo parce punctato; elytris fortiter punctatis, margine basali fasciæque transversa mox pone

medium albo-pubescente, apice truncatis, et 3 vel 4-denticulatis; pedibus piceis, antennis flavo-testaceis. Long. 4.5 mm.

Lower California, Mr. Ulke. A singular species, but resembling entirely in form and size *G. minuta*. The elytra are distinctly truncate at tip, and the truncature is serrate, the suture and outer angle being prominent, with one or two intermediate cusps.

#### **CALLIDIUM** FABR.

**485. *C. vile*.** Nigrum, subtiliter cinereo-pubescent, prothorace latitudine vix brevior, lateribus rotundatis, fortiter punctato; elytris sat dense fortiter punctatis, et transversim rugosis; antennarum articulo 2do sequente triplo brevior. Long. 4.5 mm.

Mendocino, California; collected by Mr. Behrens. Readily known by the small size, black color, and coarse sculpture. The thighs are strongly clubbed, the front coxæ are contiguous, and the mesosternum obtusely triangular. I cannot see the mesonotum, but I have no doubt from the other characters that there is no stridulating surface.

**486. *C. hirtellum*.** Elongatum minus depressum, nigrum nitidum, pubescens, et pilis nigris erectis villosum, prothorace ferrugineo, punctato, callis levibus haud elevatis ornato, latitudine paulo brevior, lateribus rotundatis; elytris concinne punctatis sæpe testaceis; antennis pilosis, basi rufescentibus, articulo 2do 3io dimidio brevior. Long. 8 mm.

Nevada, Mr. Ulke. Two specimens, one of which is black, with the prothorax ferruginous; the other has also the elytra brownish ferruginous. The mesonotum is smooth and polished, with a few scattered punctures; the mesosternum is triangular; the thighs strongly clubbed, the front coxæ contiguous. *C. æreum* Newman (pallipes Hald.), belongs to the same division of the genus, characterized by the rather stout antennæ, not thickened but very hairy towards the base, with the 2d joint about half as long as the 3d, and the punctuation less dense than in the metallic blue species.

#### **XYLOCRIUS** LEC.

**487. *X. cribratus*.** Ater, pube nigra villosus, prothorace fortiter punctato, latitudine brevior, postice subangustato; lateribus antice valde rotundatis, postice subsinuatis; elytris subreticulatim grosse punctatis, punctis versum apicem paulo minoribus. Long. 12.5 mm.

One male, Virginia City, Nevada, Mr. Edwards. Nearly allied to *X. Agassizii* Lec., but the prothorax is distinctly narrowed behind and subsinuate, very much as *Spondylis upiformis*, and the sculpture of the elytra is not suddenly finer behind the middle.

The convex sides of the prothorax are less coarsely and more densely punctured than the disk. The antennæ are two-thirds the length of the body, quite hairy, and the 4th joint is very little shorter than the 5th.

#### **GANIMUS** LEC.

Head moderately large, eyes coarsely granulated, deeply emarginate, lower lobe very large, genæ extremely short, front short, perpendicular; mandibles short, stout, acute at tip, external outline with a well-defined obtuse angle near the tip, so that the front margin is straight and transverse; palpi very unequal, last joint triangular, obliquely truncate. Antennæ (♂) longer than the body, 11th joint indistinctly divided; 1st joint thicker, and about two-thirds as long as the 3d joint, very rough with small acute spines, 3d and following rough but gradually becoming smoother, fringed beneath but not densely with hairs, which also gradually become thinner and shorter. Prothorax wider than long, feebly rounded on the sides, not constricted either before or behind, transversely impressed before the base, which is produced into a broad subtruncate lobe; disk rather flat, with a narrow, smooth dorsal line, and two vague discoidal impressions; scutellum broad, rounded behind; elytra as wide at the base as the thorax, gradually narrower behind, and rounded at tip. Prosternum laminiform between the coxæ, but not prolonged as in *Oeme*; surface in front of coxæ finely transversely rugose, and depressed each side; the finely roughened dorsal surface extends on the flanks to the prosternal suture, as in *Eucrossus*, and *Oeme*, in which the prosternum is similarly sculptured, but not depressed; the coxæ are widely angulated externally, and the whole extent of the coxal fissure is open, though not so widely as in *Oeme*. The mesosternum is very narrow, and deeply sunk between the coxæ which are very large and prominent, and the cavities are widely open externally; the hind coxæ are prominent. Legs as in the two genera just mentioned, thighs rather stout and compressed, tibial spurs small, hind tibiæ with 1st joint as long as

the others united. Ventral segments nearly equal in length, 5th of ♂ nearly equal to the 4th, truncate behind, 6th exposed, emarginate. Body thinly pubescent, above and beneath.

**488. *G. vittatus*.** Testaceus, parce pubescens, thorace dense subtilius asperato-punctato, linea tenui dorsali lævi, latitudine brevior, lateribus late rotundatis, apice truncato, basi late lobato; elytris punctatis, costis utrinque duabus parum elevatis, vittisque duabus angustis nigris. Long. 21 mill.

California, Dr. Horn. This genus seems quite distinct from any described in Lacordaire's work, and to present a curious combination of characters. The well-defined angle near the tip of the mandibles is singular, and known in very few other genera of Cerambycini.

#### **OEME NEWMAN.**

**489. *Oe. costata*.** Nigro-picea, subtiliter parce pubescens, prothorace lateribus late rotundatis, postice modice constricto, disco punctulato, et parce punctato, vitta dorsali lævi; elytris thorace latioribus, elongatis, punctulatis, sutura margine costisque 3 discoidalibus angustis elevatis, interstitiis parce reticulatis. Long. 22 mm.

California, Mr. Ulke. The male has the antennæ as long as the body; the 3—6 joints are armed beneath with acute spines gradually becoming more feeble.

#### **EUCROSSUS LEC.**

Body elongate, rather depressed, pale brown, without markings; head as in *Oeme*, eyes large, coarsely granulated, deeply emarginated; palpi very unequal, labial short, maxillary long, last joint triangular, obliquely truncate; antennæ (♂) longer than the body, 1st joint stout, as long as the head, 2d very short, 3d longer than the 4th, which is equal to the 5th, joints from 3d gradually more slender, 11th not appendiculate, 3d, 4th, and 5th armed with a very small apical spine; beneath densely fringed with long soft hair, becoming gradually thinner, and finally disappearing on the 8th joint. Prothorax wider than the head, transverse, much rounded on the sides, not constricted at base. Elytra scarcely as wide as the thorax, parallel, rounded at tip, with a small subsutural spine. Prosternum narrow, rounded at tip, front coxæ large, prominent, with distinct trochantin; cavities strongly angulated externally, middle and hind coxæ also pro-



minent; mesosternum rather wide, truncate behind, middle coxal cavities open externally. Legs moderate, thighs not clavate, tibial spurs very small, hind tarsi with the 1st joint equal to the others united.

**490. *Eu. villicornis*.** Saturate testaceus, thorace (♂) opaco, subtilissimo alutaceo et subsericeo, latitudine brevior, lateribus valde rotundatis, linea dorsali laevi, cicatrice vix elevata, sublunata utrinque notato; elytris vage punctatis, pilis erectis haud dense pubescentibus, spina parva subsuturali armatis, dorso utrinque lineis duabus obsoletis. Long. 18—24 mm.

One male, Arizona. Resembles in appearance *Oeme*, but is less slender; the sculpture of the prothorax is very peculiar, and the dull sericeous surface extends upon the flanks to the prosternum; it is somewhat similar to that seen in *Achryson*, less the punctures and hairs observed in that genus; the smooth dorsal line is rather broad, and abbreviated near the base; there is on each side a large cicatrix, commencing near the base, extending in front of the middle, then suddenly bent inwards for a short distance, and then turning forwards is suddenly abbreviated. They resemble, in position, the scars on the prothorax of the ♂ of some of our large species of *Romaleum*, but are much broader.

A female from Owen's valley, California, given me by Dr. Horn, differs from the male by the antennæ shorter, thinner, and less hairy; the 5th ventral segment not truncate, and the 6th not visible. The sides of the prothorax are finely punctured, but the disk is shining, sparsely and coarsely punctured, and somewhat uneven.

There is great variation in the lateral spine of the prothorax; in the smaller ♂ it is quite absent, and the sides are rounded; in a large ♂ from California it is small and acute, in the ♀ it is still more prominent.

#### **HAPLIDUS LEC. (Cerambycini).**

Body elongate, slender, rather depressed, antennæ, prothorax, and legs thinly clothed with long flying hairs, of which a few are also seen on the front part of the elytra; front short, vertical; eyes large, emarginate, coarsely granulated; genæ short, very acute; palpi short, equal, last joint cylindrical, truncate. Antennæ slender, scape a little shorter than the 3d joint, 4th about

one-fourth shorter than 3d or 5th. Prothorax a little longer than wide, oval, broadly rounded on the sides, feebly constricted at the base, which is truncate; disk densely punctured, with a small median smooth spot in ♀, more finely punctured with a longer dorsal smooth stripe in ♂, and with a feeble dorsal impression and obsolete cicatrix each side of the median line. Elytra elongate, parallel, rounded at tip. Prosternum very narrow and nearly invisible between the coxæ, but not prolonged behind; front coxæ transverse, widely angulated externally; mesosternum broadly truncate behind, coxæ open externally; episterna of metathorax wide in front, and narrowed almost to a point behind, as in *Oeme*. Legs slender, thighs feebly clavate, hind tarsi as long as the tibiæ, 1st joint longer than two following united. Ventral segments nearly equal in ♀, 1st longer in ♂; 5th shorter in ♂ than ♀, and broadly rounded at tip.

A slender brownish insect, without conspicuous characters, resembling somewhat a very narrow *Callidium*; the antennæ in the ♂ are as long as the body, in the ♀ about two-thirds as long.

**491. *H. testaceus*.** *Elongatus, testaceus, subtiliter pubescens, antennis pedibus prothoraceque parce longe villosis; prothorace latitudine paulo longiore, lateribus late rotundatis, postice subconstricto; elytris subrugosis, punctulatis, et parce punctatis. Long. 9—14 mm.*

California, Nevada, and Utah; Dr. Horn and Mr. Ulke. The genus is easily known by the short, slender, equal palpi, and by the eyes being less deeply emarginate than in the other genera of the group, and scarcely embracing the base of the antennæ, which are inserted on a line with their front margin.

#### ACHRYSON SERV.

**492. *A. concolor*.** *Elongatum, saturate testaceum, pilis pallidis parce vestitum, prothorace opaco latitudine longiore, utrinque angustato, lateribus late rotundatis, confertim haud profunde punctato, subreticulato; elytris nitidis, fortiter haud dense punctatis, punctisque remotis majoribus seriatim digestis, apice haud spinosis. Long. 8.5 mm.*

One female; Texas. Of the same form as *A. surinamum*, but smaller; uniform brownish-testaceous, thinly clothed with long pale hairs; the head and thorax are coarsely punctured, the punctures of the latter are not deep, but so close as to produce a reticulate appearance, and in the centre of each puncture is a

small puncture from which proceeds a long white hair. The elytra are somewhat paler, polished, deeply but sparsely punctured, with several rows of very distant larger punctures, from which proceed rather longer flying hairs.

#### **AXESTINUS** Lec.

Eyes large, coarsely granulated, lower lobe extending in front of the antennæ, which are shorter than the body, compressed serrate, finely sericeous, 12-jointed, with the 4th joint scarcely shorter than the 3d or 5th, and the 12th elongate oval, half as large as the 11th. The genæ are very short, the front quadrate, oblique, concave between the antennal tubercles, otherwise flat and divided by a fine transverse suture; palpi moderate, subequal, last joint thicker, truncate. Prothorax rounded on the sides, longer than wide, somewhat narrowed in front, with two discoidal impressions in front of the middle; sparsely coarsely punctured, with feeble transverse rugæ. Front coxal cavities rounded, the fissure being completely closed. Middle coxal cavities nearly closed externally. Episterna of metathorax narrow, nearly parallel, with a small scent pore near the hind coxæ. Prosternum narrow, mesosternum flat, truncate and subemarginate behind, ventral segments nearly equal, 5th broadly emarginate (♂ ?) at tip. Legs slender, thighs not clavate nor spinose, tibiæ slender, hind tarsi with 1st joint scarcely as long as the two following.

**493. A. obscurus.** Piceus, subtiliter cinereo-pubescent, prothorace latitudine longiore, antice angustato, dorso antice utrinque impresso, parce vage punctato, et transversim ruguloso, lateribus sub-angulatis rotundatis; elytris thorace latioribus postice paulo angustatis, apice bispinosis, dense punctulatis, punctis majoribus versus basin intermixtis. Long. 30 mm.

One specimen, from Pope's Expedition, probably from the Rio Grande valley. This genus seems related most nearly to *Xestia*, but differs from it by the punctulate and finely pubescent surface.

#### **OSMIDUS** Lec.

Head rather large, eyes large, coarsely granulated, deeply emarginate; front short, nearly perpendicular, without deep frontal suture, vertex between the antennæ not concave; mandibles small, acute, curved; palpi unequal, last joint triangular obliquely

truncate. Antennæ longer than the body (♂), slender, densely finely pubescent, not sericeous, 3d and following joints scarcely differing in length, 11th equal to 10th, not divided. Prothorax oval, longer than wide, uniformly convex and densely pubescent, with two basal and two discoidal impressions, very faintly marked; truncate at base and tip, not constricted. Scutellum triangular, rounded behind, elytra scarcely wider than prothorax, elongate, parallel, rounded at tip with a small apical spine, near but not on the suture. Front coxal cavities angulated externally, although the fissure is open only for a short distance; prosternum moderate in width, rounded behind; mesosternum parallel, moderate in width, and subemarginate behind, coxal cavities open externally, epimera not intervening between the sternal plates. Episterna of metathorax narrow, with scent pores distinct. Ventral segments gradually decreasing in length, 6th in ♂ slightly protruding, and more hairy. Legs rather long, thighs stout, but not clubbed, tibial spurs small, 1st joint of hind tarsi as long as the two following.

The body is densely covered with short uniform cinereous pubescence, with small scattered denuded round spots on the elytra, as in some species of *Hesperophanes*, to which it is allied, but differs by the more elongate form, and the absence of the deep transverse frontal suture.

**494. *O. guttatus*.** *Elongatus, piceus, dense breviter cinereo-pubescent, prothorace confertim punctato, latitudine longiore lateribus rotundatis, apice basique truncato, disco antice vage blimpresso, et utrinque ad basin leviter impresso; elytris elongatis, parallelis, punctatis, guttis pluribus parvis rotundatis denudatis, apice rotundatis et breviter acuminatis.* Long. 17—19 mm.

Two males; Cape San Lucas, Mr. Xantus.

#### **EBURIA SERV.**

A polymorphic genus, with which should probably be recombined some of the genera that have been separated from it. Those tabulated below, however differing in other characters, have the front coxal cavities more or less angulated externally, sometimes nearly rounded, and the joints of the antennæ not sulcate. In the ♂ of the first two species the basal joint of the antennæ is somewhat flattened in front, but not sufficiently so to warrant their reception in the group *Coeleburia*.

A. Middle and hind femora produced at tip into two acute spines; elytra bispinose at tip;

- a. Front coxæ not angulated, fissure completely closed; prothorax abruptly constricted before and behind, tuberculate and strongly armed on the sides; color piceous;

Body glabrous above, slightly pubescent beneath, prothorax feebly grossly punctured; elytra with very small ivory spots of which the medial pair and the outer basal one are frequently wanting. 1. *ULKEI*.

Body densely and finely pubescent, prothorax with a few very large punctures; elytral spots small, distant, outer basal one sometimes wanting, elytral spines equal. 2. *PERFORATA*, n. sp.

- b. Front coxæ angulated; prothorax densely and coarsely punctured, sides subtuberculate in front; lateral spine small, acute, dorsal callosities denuded, color testaceous;

Lateral tubercle of prothorax very distinct; elytra with outer spine shorter, and ivory spots smaller. 3. *HALDEMANI*.

Lateral tubercle of prothorax feeble; elytra with outer spine longer, and ivory spots larger. 4. *QUADRIGEMINATA*.

- c. Front coxæ angulated; prothorax densely and finely punctured, transversely impressed before and behind the middle, lateral spine acute; color testaceous;

Ivory spots very unequal, thoracic spine strong. 5. *STIGMA*.

Ivory spots equal, large, thoracic spine very small, (femoral spines very long). 6. *DISTINCTA*.

B. Femora with short apical spines; elytra obliquely truncate inwards at tip; prothorax coarsely and densely punctured, rounded on the sides, with two denuded dorsal callosities; color testaceous; front coxæ distinctly angulated. *PANTOMALLUS* Lac.

- Ivory spots of elytra unequal. 7. *OVICOLLIS*, n. sp.

C. Femora without spines, apical angles obtuse; elytra transversely subtruncate; prothorax with four dorsal callosities before the middle, lateral spine very small, (front coxæ not angulated);

Abdomen densely, but equably and less finely punctured; sides of prothorax much rounded in front of the spine. 8. *TUMIDA*, n. sp.

Abdomen unequally punctured; sides of prothorax very feebly rounded in front;

Ivory spots geminate, apex of elytra truncate. 9. *MUTICA*.

Ivory spots single, apex of elytra nearly rounded, with a small sutural spine. 10. *MANCA*.

1. *E. Ulkei* Bland, Proc. Am. Ent. Soc. Phila., i. 270; Lower California, Cape San Lucas, Mr. Xantus. The antennal tubercles are very acute and elevated, the 1st joint of the antennæ is in the ♂ stouter, flattened or feebly sulcate in front, and the 11th joint is longer than the 10th.

**495. *E. perforata*.** Robusta, picea, dense sordide cinereo-pubescent, prothorace latitudine brevior, apice basique constricto, lateribus ante medium tuberculatis, ad medium spina valida armatis, dorso punctis grossis parvis notato; elytris punctulatis et haud profunde punctatis, apice bispinosis, callis eburneis parvis valde discretis, exteriore basali saepe deficiente. Long. 23—30 mm.

Texas and Northern Mexico. I should consider this as *E. stigmatica* Chevr. Col. Mex. Cent. 1., but the description states that the sutural spine of the elytra is wanting, the tip being truncate. The basal joint of the antennæ in the ♂ is a little flattened in front, and the 11th joint is a little longer than the 10th.

2. *E. Haldemani* Lec., Journ. Acad. Nat. Sci., Phila., 2d, ii, 102, I have a specimen from Missouri which is almost intermediate between the Texan specimens, and the ordinary 4-*geminata* of the Southern States, and the Mississippi valley. The elytral spots are smaller than the specimens from Georgia, as is usually the case with the Missouri specimens, but the subapical protuberance on the sides of the prothorax is as strong as in any Texan specimen of *E. Haldemani*. In all of the latter species that I have seen, the sutural spine is well marked, while the outer one is short, and not prominent; the specimen in question has them equal as in *E. 4-geminata*. The evidence is in favor of combining the two forms as one species, but for the present it is safer to retain them as distinct.

**496. *E. ovicollis*.** Elongata, fusco-testacea, piceo-nebulosa, subtiliter dense pubescens, prothorace latitudine longiore, lateribus late rotundatis, confertim punctato, callis discoidalibus duobus denudatis, apice et basi truncato haud constricto; elytris apice intus oblique truncatis, vix aut breviter spinosis, fortiter sat dense punctatis, callis eburneis geminatis approximatis, basalibus parvis, mediis elongatis, internis autem multo brevioribus. Long. 18—23 mm.

Texas and Northern Mexico. The 11th joint of the antennæ of ♂ is longer than the 10th; the hind femora extend a little beyond the tip of the elytra, and are not spinose at tip. The front coxæ are very distinctly angulated externally, though hardly more so than in the four preceding species in the synoptic table, and the coxal fissure is open for a small portion of its extent.

In one specimen the inner basal ivory spot is almost wanting; in another the outer one is so reduced as to be hardly larger than the inner one.

**497. *E. tumida*.** Fusco-picea, dense minus subtiliter griseo-pubes-cens, prothorace latitudine brevior, antice transversim marginato, lateribus pone apicem subito rotundatis, spina laterali minuta, parce fortiter punctato, callis 4 denudatis ante medium transversim sitis, intermediis elatioribus; elytris haud dense punctatis, apice paulo truncatis, spina externa obsoleta, suturali distincta, callis eburneis parvis discretis. Long. 15—20 mm.

Texas; the body beneath is densely punctured, clothed with rather coarse pubescence. The ivory spots of the elytra are small, in one specimen the outer one of the hind pair is longer than the inner one, and the spots of the basal pair are nearly equal; in a second specimen the outer basal spots are nearly obliterated, and the hind pair are reduced to merely elevated points. The front coxæ not at all angulated externally.

### **ELAPHIDION SERV.**

Sub-Genus **ROMALEUM** WHITE.

The species of this sub-genus differ from genuine *Elaphidion* by the more robust form, and by the episterna of the metathorax being distinctly wider in front, and gradually narrowed behind, though much less so in the 2d division than in the 1st. The prothorax is comparatively wider, and has a slight tendency to a tubercle on the sides; the pronotum is coarsely punctured with a medial and two dorsal callosities in ♀, very densely punctulate, with a posterior medial channel and dorsal cicatrices in the ♂. The antennæ are longer than the body in ♂, shorter in ♀, the spines are never long, the sensitive spaces are distinct, commencing on the 4th joint in a small elongate depression, extending on the following joints so as to occupy gradually the whole length; a very small fovea may be usually seen near the end of the 3d joint. The prosternum is always rounded behind, and the mesosternum gently declivous. The femora are not spinose. The last joint of the palpi is less dilated than in genuine *Elaphidion*.

The species form two natural groups:—

**A. Body uniformly finely pubescent;**

- |   |                          |
|---|--------------------------|
| Both angles of 3d and 4th joint of antennæ spinose. | 1. <b>PROCERUM.</b>      |
| Outer angle of 3d and 4th joint spinose.            | 2. <b>SIMPLICICOLLE.</b> |

**B. Body irregularly pubescent, with spots of coarser and denser hair.**

- |                                |                      |
|--------------------------------|----------------------|
| Pubescence mottled, irregular. | 3. <b>ATOMARIUM.</b> |
| Pubescence uniform, fulvous.   | 4. <b>RUFULUM.</b>   |

Sparsely pubescent, elytra very coarsely punctured before the middle, with an irregular transverse patch of white pubescence at the middle.

5. *TANIATUM*.Sub-Genus ELAPHIDION.

The metathoracic episterna are scarcely wider in front than behind, and there are no distinct sensitive spaces on the antennæ; the antennæ are longer than the body in the ♂ and shorter in the ♀. The prothorax of the ♂ in some species is more finely punctured than in the ♀, but the difference is never as obvious as in the preceding sub-genus; the prothorax is sometimes rounded on the sides, sometimes straight, and usually marked with dorsal callosities. The prosternum is sometimes perpendicular behind, in which case the mesosternum is suddenly declivous in front, and the femora spinose at tip; otherwise it is rounded, the mesosternum obliquely declivous, and the thighs unarmed; in the second case the elytra are sometimes merely truncate or even rounded at tip, and the antennal spines occasionally obsolete. The scent pores are usually not very distinct, sometimes (*E. subpubescens*) remarkably large, sometimes (*E. moestum*) apparently wanting. The legs are usually finely punctured and pubescent, without distinct flying hairs, sometimes coarsely punctured and sparsely hairy, the hairs being in a few species very long (*E. pusillum*). The body is more or less densely pubescent, except in *E. unicolor*, which is polished as in *Ibidion* and *Sphæridon*.

A. Antennæ and elytra with very long spines; thighs spinose at tip; prothorax perpendicular behind, mesosternum gibbous; prothorax ♂ ♀ similar, with several callosities;

Above glabrous, with patches of white hair.

6. *IRRORATUM*.

Above clothed irregularly with gray pubescence.

7. *MUCRONATUM*.

B. Antennal spines small; prosternum rounded behind, mesosternum obliquely declivous; thighs not spinose at tip; prothorax ♂ finely, ♀ more coarsely punctured; (scent pores indistinct in a, b, or very obvious, c, or wanting d);

a. Prothorax rounded on the sides with several dorsal callosities, elytra truncate and strongly bispinose at tip;

Pubescence grayish-brown, mottled.

8. *INCERTUM*.

b. Prothorax feebly rounded on the sides, elytra not bispinose at tip, pubescence grayish-brown, mottled, (legs densely punctured and pubescent);

Thorax with a medial smooth space, and no discoidal callosities, tip of elytra truncate inwards, not spinose.

9. *INERME*.



Thorax with a medial smooth space and two small discoidal callosities, tip of elytra subtruncate, sutural spine distinct. 10. *TRUNCATUM*.

Thorax more rounded on the sides, dorsal space coarsely punctured, tip of elytra rounded, suture not spinose. 11. *SPURCUM*.

c. Prothorax scarcely rounded on the sides, nearly cylindrical (except in *pumilum*), elytra bispinose at tip;

α. Pubescence mottled, flying hairs not very obvious; elytral spines long; legs densely punctured and pubescent;

Prothorax scarcely longer than wide. 12. *VILLOSUM*.

Prothorax distinctly longer than wide. 13. *PARALLELUM*.

β. Pubescence mottled, flying hairs very long and numerous on legs and antennæ, legs very sparsely punctured;

Elytral spines very short. 14. *PUMILUM*.

γ. Pubescence sparse, coarse, uniform, body very long and slender, coarsely punctured, legs coarsely punctured;

Flying hairs sparse, antennal and elytral spines moderately long.

15. *SUBPUBESCENS*.

Flying hairs long; antennal and elytral spines long.

16. *ACULEATUM*, n. sp.

δ. Body shining, testaceous, sparsely punctured, nearly glabrous;

Flying hairs sparse; elytral spines long. 17. *UNICOLOR*.

d. Prothorax rounded on the sides, coarsely punctured (♂ ♀) without callosities, body more robust, uniformly coarsely and sparsely pubescent, elytra rounded at tip; legs coarsely punctured; scent pores not visible. 18. *MORSTUM*.

C. Antennal spines completely wanting; pubescence uniform sparse; form slender, prothorax feebly rounded on the sides;

a. Pubescence intermixed with long flying hairs, elytra rounded at tip, legs very finely pubescent, scarcely punctured.

19. *PUNCTATUM*, n. sp.

b. Pubescence without long flying hairs; elytra truncate at tip, legs very coarsely punctured; punctuation of prothorax ♂ ♀ dissimilar, (*ANOPLIUM* Hald., emend. Lac.) 20. *CINERASCENS*.

E. (R.) *operarium* White, B. M. Cat., Long. 309, 1855, is either *procerum* or *simplicicollis*; the locality is given as doubtfully Indian, and the characters are not sufficient to determine to which of the two species it should be referred.

4. *E. (R.) rufulum* Hald., seems sufficiently distinct by the much finer and less mottled pubescence, though very closely allied to *atomarium*. The correct synonymy of the latter is as follows: *Cer. atomarius* Drury, = *C. pulverulentus* De Geer, = *Stenocorus marylandicus* Fabr., = *Callidium maryl. Olivier*. The second name was erroneously applied by Haldeman to the species, a variety of which was afterwards described by him as

*Enaphalodes simplicollis*, without generic definition. It is useful to mention, as showing the instability of the characters relied on as of value in the classification of Cerambycidae, that there is before me a specimen of *E. rufulum* in which the left front coxal cavity is open as much as in any *Hesperophanes*.

*Thersalus bispinus* Pascoe, Journ. Ent. ii, 372 (1855), is closely allied to if not identical with *E. (R.) atomarium*, and the fact that it was previously described (Trans. Ent. Soc. Lond., 3d, i, 562) as *Phacodes*, indicates tolerably clearly that the genus *Phacodes* should be partly suppressed, as being merely a slight Australian geographical variation upon *Elaphidion*.

7. *E. mucronatum* (Fabr.), Hald., = *muricatum* Hald.

8. *E. incertum* Newm., = *asperum* Hald., = *vicinum* Hald. = *neglectum* Lec.

9. *E. truncatum* Hald., which has been cited as synonymous with *E. inerme* Newman, is quite distinct by the characters given above. The type, now in my possession, is probably Mexican, but the species has since occurred in Texas and is = *E. debile* Lec.

12. *E. villosum* (Fabr.) = *Stenocorus putator* Peck.; ♂ with 5th ventral rounded at tip.

13. *E. parallelum* Newman, = *arctum* Newm., = *oblitum* Lec.; ♂ with 5th ventral truncate at tip.

15. *E. subpubescens* Lec., New Jersey and Texas. The palpi in this species are very unequal, but this character hardly indicates a distinct genus.

**498. *E. aculeatum*.** Valde elongatum, piceo-testaceum, parce longius pubescens, et pilis volatilibus villosum, prothorace latitudine sesqui longiore, medio paulo latiore, confertim grosse punctato, callo dorsali inconspicuo laevi; elytris minus dense punctatis, nitidis, apice fortiter bispinosis, spina exteriori elongata; antennarum articulis 3io et 4to spinis longis, 5to autem brevi armatis. Long. 15 mm.

One ♂, Texas, Dr. Horn. Nearly allied to *E. subpubescens* Lec., but easily known by the prothorax being less cylindrical, the outer spine of the elytra and the antennal spines much longer, by the flying hairs much longer, and the body beneath coarsely not densely punctured. The hind angles of the metasternum are densely pubescent, the scent pores moderately distinct, and the

legs coarsely punctured. The ventral segments diminish rapidly in length, and the 5th joint is broadly truncate.

17. *E. unicolor*; *Stenocorus un.* Randall, *Stizocera un.* Hald., *Psyrassa un.* Pascoe. I can find no sufficient characters for separating this as a distinct genus, much less placing it in another tribe.

**499. *E. punctatum.*** Elongatum piceum, fortiter punctatum, pilis longiusculis griseis parce vestitum, prothorace latitudine longiore, linea dorsali laevi calloque elongato indistincto utrinque notato; elytris parallelis, apice rotundatis haud spinosis, scutello luteo-pubescente; palpis antennis pedibusque ferrugineis, pube subtili pallida vestitis, his vix punctulatis, pilis volatilibus elongatis sat numerosis, antennis haud spinosis; metasterno poris odoriferis nullis. Long. 10—12 mm.

Two females, Cape San Lucas, Lower California; Mr. Xantus. The body beneath is finely punctulate and pubescent, with longer hairs intermixed. The general form is as slender as in *E. parallelum*.

19. *E. cinerascens* Lec., *Anoplium unicolor* || Hald.; ♂ with 5th ventral emarginate, leaving the 6th visible. Placed by Lacordaire in his group *Callidiopsides*, but I can see no reason for separating it so widely from *Elaphidion*, to which it is evidently most closely related.

### **ANEFLUS LEO.**

This genus is rendered necessary for certain species which completely resemble the elongate forms of *Elaphidion*, (*subpubescens*, etc.), in appearance, sculpture, and pubescence, but differ by having the joints of the antennæ from the 5th flattened, and distinctly carinate along the middle of the flat sides. The legs are coarsely punctured and pubescent, the tibiæ are finely carinate, but not more distinctly than in many species of *Elaphidion*, and except in *E. tenue*, the carinæ are not visible on the hind pair; the spurs are well developed. The 1st ventral is evidently longer than the others, and the 5th in ♂ is broadly emarginate.

The species may be tabulated as follows:—

- A. Prothorax distinctly dilated and feebly angulated on the sides; elytra bispinose at tip; hind tibiæ scarcely carinate; palpi unequal, with the last joint dilated triangular;

Very large, spines of antennæ moderately long.

1. *PROTENSUS*.

13 June, 1873.

B. Prothorax cylindrical, sides nearly straight ;

- a. 3d joint of antennæ with spine a little longer than that of the following joint ; palpi with last joint not dilated ;

Elytra emarginate at tip, slightly bispinose, flying hairs of tibiæ long, not very numerous.

2. LINEARIS.

- b. 3d joint of antennæ with the spine much longer ;

Elytra emarginate at tip, flying hairs of tibiæ not conspicuous, palpi with last joint not dilated.

3. TENUIS.

Elytra truncate at tip, suture more prominent, flying hairs of tibiæ long, numerous ; palpi very unequal, with last joint triangular, dilated ; (antennal carinæ obsolete).

4. VOLITANS, n. sp.

1. *A. protensus*, Elaphidion prot. Lec., Proc. Acad. Nat. Sci., 1858, 82. Arizona.

2. *A. linearis*, Elaphidion lin. Lec., ibid. 1859, 80. California.

3. *A. tenuis*, Elaphidion tenue Lec., ibid. vii, 81. Texas and Arizona. In this species, as in the preceding, the palpi are not dilated and not very unequal ; the hind tibiæ are, however, much more distinctly carinated ; the spine of the 3d antennal joint is two-thirds as long as the 4th joint, and the spine of the latter is quite small.

**500. A. volitans.** Fuscus, parce longe pallide pubescens, prothorace latitudine longiore confertim punctato, lateribus late rotundatis ; elytris fortiter punctatis, apice truncatis, sutura prominula ; tibiis pilis volatilibus longis, conspicuis. Long. 10 mm.

One female, Cape San Lucas, Mr. Xantus. In this species as in *A. protensus*, the first joint of the antennæ is longer and less thickened than in *linearis*, and slightly curved ; the outer joints are scarcely carinate, the spine of the 3d joint is two-thirds as long as the 4th joint, and the spine of the latter is also long, being fully one-third as long as the 5th joint. The palpi are very unequal, and the last joint is triangular and much dilated. The hind tibiæ are only feebly, and hardly perceptibly carinate.

#### EUSTROMA Lec.

This new genus is founded upon *Elaphidion validum* Lec., Proc. Acad. Nat. Sci., Phila. 1858, 82, which occurs in Texas, Arizona, and Lower California. It is allied to *Elaphidion*, but differs in having the antennæ shorter and stouter, with the outer joints compressed, sericeous pubescent ; the lower joints are

shining, sparsely punctured, and thinly clothed with long fulvous hairs, the 3d and 4th are flattened, and slightly concave beneath; the 1st joint is as long as the 3d and stouter, the 3d is equal to the 5th in length, but is thicker and armed with a short spine at the outer angles, the 4th is about two-thirds as long as the 3d, and armed with a smaller spine; the spines of the 5th and 6th joints are very small; the palpi are unequal, and the last joint is somewhat, though not very strongly, triangular. The mandibles are stout, acute, and the outer margin is suddenly bent near the tip in the ♂ so as to appear transversely truncate (as in *Axestinus*), but is regularly curved, and normal in form in the ♀. The front coxal cavities are rounded, not at all angulated externally, and only narrowly open behind; the prosternum is rounded behind; the mesosternum nearly perpendicular in front, horizontal, and emarginate behind; coxal cavities closed externally, and scarcely angulated. Ventral segments slightly decreasing in length, 5th rounded at tip in both sexes. Legs short, stout, densely and coarsely punctured, tibiae strongly carinate, and broadly grooved, spurs moderate, tarsi broad, 1st joint of hind pair but little longer than the 2d.

The body above and beneath is punctured, and clothed with rather coarse, yellowish-brown hair; the prothorax has several smooth confluent spaces, the intervals being very coarsely punctured; the ♂ has in addition a large lateral densely pubescent spot; the scutellum is broad and rounded behind, the elytra are feebly truncate at tip, and armed with a small sutural spine. The form is robust, about like *Elaphidion atomarium*.

This species by the hairy spaces of the prothorax shows some resemblance to *Stromatium*, from which it is quite distinct by the front coxal cavities not angulated externally as well as by many other characters above detailed.

#### ZAMODES Lec.

Head moderate, front short, nearly perpendicular, frontal suture oblique each side, deep; eyes coarsely granulated, deeply emarginate, upper part less narrow than usual; mandibles small, curved acute; palpi not very unequal, last joint triangular obliquely truncate. Antennæ (♂) a little longer than the body, punctured, finely pubescent, hispid with numerous long, erect flying hairs, thicker at the base, gradually attenuated externally,

not sulcate nor carinated, 3d joint a little longer than the 4th, the latter and following ones nearly equal, 11th very feebly appendiculate. Prothorax rounded on the sides, constricted at the basal margin, without dorsal callosities. Elytra parallel, rounded at tip. Front coxal cavities round, not at all angulated externally; open behind, prosternum very narrow between the coxæ; middle coxæ rather widely separated, scarcely angulated externally, mesosternum subtriangular, emarginate behind; metathorax emarginate behind, episterna narrow, scent pores not distinct; ventral segments equal, 1st a little longer, 5th rounded at tip, 6th not visible. Legs stout, thighs compressed, gradually tolerably strongly clavate, tibiæ not carinate, spurs moderate, first joint of hind tarsi as long as the two following.

The body is covered with fine short brown pubescence, with long erect hairs intermixed.

**501. *Z. obscurus*.** Supra piceo-niger, opacus, dense subtiliter fusco-pubescent, pilis erectis intermixtis, prothorace latitudine haud longiore, lateribus rotundatis, punctulato et haud profunde grosse punctato; elytris antice fortiter punctatis, punctis postice sensim subtilioribus; subtus piceus, subtiliter punctulatus, pubescens et pilosus, prosterno vage punctato. Long. 13 mm.

One specimen; Pennsylvania. Of the same form and size as *Tylonotus bimaculatus*, but quite distinct by the antennæ not being sulcate, the prothorax without callosities, and the piceous legs. The general appearance is that of a *Callidium*.

It is quite possible that this genus is not distinct from *Zamium Pascoe*. It agrees in all particulars with the detailed description given by Lacordaire, l. c. viii. 215, but does not possess the group characters of *Saphanides*, in which *Zamium* is placed by my learned and lamented friend. The second joint of the antennæ is quite small in the present genus, which would prevent its association with *Saphanus*, *Opsimus*, etc.

#### **COMPSA** PERRY emend. LAC.

**502. *C. puncticollis*.** Elongata, picea, pube brevi cinerea pruinosa, prothorace latitudine duplo longiore, lateribus paulo rotundatis, confertim punctato, opaco; elytris nitidis, punctulatis punctisque majoribus raris intermixtis, scutello dense cinereo-pubescente. Long. 8—13 mm.

Cape San Lucas, Lower California, Mr. Xantus. The 3d and following joints of the antennæ are finely carinate, and the

front coxal cavities are entirely closed ; in the ♂ the 3d and 4th joints are as stout as the 1st, and the 5th is less enlarged. The 4th joint is shorter than the 3d in both sexes, but is as long as the 5th.

**503. *C. quadriplagiata*.** Piceo-castanea, subtilissime cinereo pubescens, prothorace impunctato, latitudine plus duplo longiore, callo angusto ad medium elevato, disco utrinque magis convexo et ante basin bituberculato; elytris parce punctatis, punctisque majoribus raris intermixtis, macula utrinque pallida quadrata ante medium, alteraque pone medium ornatis; antennis flavo-testaceis, basi castaneis. Long. 10 mm.

One ♀; Cape San Lucas, Lower California; the dorsal callus of the prothorax is narrow, short, and carinated; the disk each side is more convex, but scarcely gibbous; near the base on each side is seen an elevated tubercle. The larger punctures of the elytra in this and the preceding support flying hairs, which are not however very long or as conspicuous as in the polished species of *Heterachthes*.

#### PLECTROMERUS Lsc.

I have adopted this unpublished name of Dejean for *Callidium dentipes* Oliv.; (*Curus scambus* Newm.). It is fully described by Lacordaire, l. c. viii. 352, as *Curus*; the type of the genus *C. dentatus* (*concinatus* Hald.) not having been seen by him; he has mentioned the differences in a note, and they are chiefly as follows

Body depressed, opaque in *Curus*, cylindrical and polished in *Plectromerus*; prothorax rounded on the sides in the first, nearly straight in the second; 4th joint of antennæ a little shorter than the 5th in the first, very much shorter in the second. The thighs are pedunculated, and suddenly clavate in *Plectromerus*, and the tooth is much larger than in *Curus*, in which they are more gradually dilated.

#### CALLIMUS Muls.

**504. *C. chalybæus*.** Viridi-cyaneus, nitidus, prothorace latitudine longiore, parce punctato, lateribus late rotundatis, convexo postice paulo angustiore et constricto; elytris parallelis apice rotundatis, parce punctatis et pallide pubescentibus; femoribus anticis, vel ferrugineis, vel cyaneis. Long. 6 mm.

California; Mr. Ulke and Dr. Horn. The punctures of the elytra are tolerably strong near the base, and become finer towards the apex. The prosternum is sparsely punctured, the abdomen nearly smooth. I have seen four specimens, all males, having the ventral segments nearly equal. The eyes are rather finely granulated, and the last joint of the palpi is broadly triangular.

#### **EUMICHTHUS** Lec.

Front declivous, with a deep lunate impression each side; eyes not very finely granulated, deeply emarginate; genæ short not prominent; palpi rather short, last joint triangular, not so broad as in *Callimus*; antennæ slender, a little longer than the body (♂), with a few long flying hairs, 2d joint half as long as 3d, remaining joints nearly equal. Prothorax convex, without tubercles, narrowed feebly in front, more strongly behind; elytra wider than prothorax, cylindrical, rounded at tip. Prosternum very narrow, mesosternum triangular, moderately wide; thighs strongly clubbed, tarsi with the 1st and 2d joints swollen and convex; the 3d is also enlarged in the front and middle pairs but is smaller in the hind pair.

**505. Eu. œdipus.** Piceo-ferrugineus, subtiliter pubescens, pilis volatilibus parce pilosus, capite thoraceque vix punctulatis, hoc latitudine paulo longiore, lateribus rotundatis, postice angustiore et constricto; elytris punctulatis, fascia pallida subburnea obliqua ante medium pube dense pallida vestita, alteraque latiore pone medium cinereo-pubescente ornatis, spatio intermedio nigricante. Long. 5 mm.

One ♂; Vancouver Island, Mr. Matthews. A very singular little insect, having from the form of the elytral bands a resemblance to *Callidium decussatum* Lec. The elytra are marked near the base with a few scattered large punctures, from which proceed long black flying hairs; the front band is covered with dense whitish hair, but looks as if it were slightly elevated; it is feebly sinuate, directed backwards towards the suture.

#### **PHYTON** Newm.

**506. P. discoideum.** Rufo-testaceum nitidum, oculis magnis fortiter granulatis, prothorace antice posticeque constricto, basi valde angustato, lateribus obtuse fortiter dilatatis, dorso subinæquali parce punctato; elytris parce punctatis, nebula magna fusca maculam rotundatam



*pallidam* communem includente; antennis ♂ corpore paulo longioribus. Long. 6 mm.

Two ♂, Cape San Lucas, Mr. Xantus. Varies with the elytral markings obsolete. Of the same form as *P. pallidum* (Say) (*Diozodes pall.* *Hald.*, *P. limum Newm.*), but quite different by the markings.

#### **HYBODERA LEC.**

Front declivous, canaliculate, divided anteriorly by a deep transverse line; eyes finely granulated, deeply emarginate; genæ short rectangular; palpi equal, slender, last joint slightly oval. Antennæ slender, scape as long as 3d joint, 3-5 gradually increasing in length. Prothorax strongly constricted in front, less behind, base as wide as the apex, sides obtusely angulated, disk with four tubercles arranged in a square. Elytra wider than prothorax, flat parallel, rounded at tip. Front coxæ separated by prosternum, widely angulated externally, inclosed behind; middle coxæ widely separated by truncate mesosternum, narrowly open externally; epimera of metathorax wider in front, gradually narrowed behind. Thighs very strongly clubbed; 1st joint of hind tarsi equal to 2d and 3d united.

In the ♀ the 1st ventral segment is very long; the 2d deeply excavated, and nearly perpendicularly declivous behind, the following joints short and retracted.

A few flying hairs are seen on the antennæ and legs.

**507. *H. tuberculata*.** Nigro-picea, pube appressa brevi cinerea vestita, prothorace elytrisque fusco-variegatis. Long. 9 mm.

Oregon and Vancouver Island. The mottlings of the elytra are not very definite, but the cinereous portions are more concentrated at the base, and in a broad band behind the middle.

#### **PILEMA LEC.**

This genus resembles so closely the European *Cartallum*, that no detailed description is necessary. It agrees precisely in form, appearance, and general characters, but differs by the palpi being slender, with the last joint cylindrical (not triangular), and by the mesosternum being wide and truncate (not narrow and subacute behind). The hind tibiæ are somewhat curved.

**508. *P. ruficolle*.** Nigrum opacum, prothorace rufo nitido paroe punctato, disco fortiter trituberculato, medio subtiliter carinato, antice constricto, lateribus obtuse tuberculatis, basi subconstricto profunde transversim impresso, margine basali nigro; elytris planis, punctatis, angulo suturali prominulo. Long. 8—9 mm.

Napa, and Mariposa; California. The 1st ventral segment in ♀ is as long as the others united, the 2d excavated, clothed with very long fulvous hair. The antennæ and legs are clothed with very long flying hairs; on the prothorax and elytra only a few remain, having been lost probably in the alcohol in which the specimens were preserved.

**509. *P. cyanipenne*.** Flavo-ferrugineum, longe villosum, (prothorace ♀ rufo, ♂ nigro) capite, antennis, pospectore, femoribus apice, tibis tarsisque nigris; elytris cyaneis, planis, punctatis. Long. 7—8 mm.

California, Dr. Horn and Mr. Edwards. Of the same size as the preceding, but the prothorax is less angulated on the sides, not deeply transversely impressed at the base, and there is no impressed dorsal line.

Two ♂ have the prothorax black, the base of the tibiæ yellow, and the elytra greenish-blue.

#### **MEGOBRIUM** Lnc.

This new genus is founded on a comparatively large species from California, which is intermediate between *Cartallum* and *Pilema*, having the palpi with the last joint slightly dilated and oval, truncate at tip, and the mesosternum narrow, but scarcely acute as in *Cartallum*. It differs from both by the prothorax being longer, with the lateral tubercles much larger and obtuse, and the apical and basal constrictions longer, equal in width. As is commonly the case, in intermediate grades of structure, the specific characters are quite different, so that a stronger individuality is thereby impressed on the organism. The color is testaceous; the punctures of the elytra but few, not coarse, and arranged in three lines extending from the base to a little behind the middle; there are a few scattered punctures between these lines, and outside of them; there is an appearance of an angulated pale band, with the point directed forwards on the suture, in front of the middle, and a few nebulosities behind. The antennæ are longer than in *Pilema*, and the outer joints are compara-

tively more equal. The sexual characters are as in the two allied genera.

**510. *M. Edwardsii*.** Fusco-testaceum, opacum parce pubescens, antennis pedibus prothoraceque pilis volatilibus parcius villosis, hoc latitudine longiore, tuberculo laterali majore obtuso, antice posticeque late constricto et lateribus sinuato; elytris alutaceo-granulatis, versus suturam parce punctato-striatis, punctis pone medium obsoletis, litura angulata pallidioris mox ante medium signatis. Long. 12 mm.

One ♀; Santa Rosa Island, California, Mr. H. Edwards, to whom I take pleasure in dedicating this remarkable addition to our fauna.

#### ***MOLORCHUS* FABR.**

**511. *M. longicollis*.** Niger, antennis pedibus prothoraceque pilis volatilibus munitis, hoc latitudine sesqui longiore, apice basique constricto, pone medium paulo latiore, et lateribus angulato, dorso planiusculo minus dense punctato; elytris punctatis, testaceis, planis, oblique impressis et ad apicem paulo tumidis; pedibus antennarumque basi piceo-ferrugineis. Long. 8 mm.

One ♂, California, Mr. Ulke. Differs from *M. bimaculatus* chiefly by the prothorax being narrower, less rounded, somewhat angulated at the sides, and less densely punctured. The antennæ are longer than the body, slender, piceous, with the first joint brownish-red.

#### ***RHOPALOPHORUS* SZEV.**

**512. *R. lævicollis*.** Niger, opacus, prothorace impunctato, cinereo pubescente, vitta dorsali glabro, apice basi subtusque plus minusve rubro; elytris fortiter punctatis, cinereo-pubescentibus; antennarum articulo 4to sequentis dimidium æquante. Long. 12 mm.

Texas and northern Mexico. Larger than the other species in our fauna, and easily known by the impunctured prothorax, which is distinctly constricted on the sides at the base, though the constriction does not extend upon the disk.

#### ***HOLOPLEURA* LEC.**

Body elongate, rather depressed, densely punctured, pruinose with extremely short white hairs, head short, front small, vertical, mouth small; palpi short, stout, genæ moderately long; eyes rather small, somewhat finely granulated, very deeply emarginate, upper lobe very narrow; antennæ widely separated, placed on

very feebly elevated tubercles, 11-jointed, sparsely fringed with long hairs, scape stouter, cylindrical, as long as 3d joint, 2d joint small, 4th about one-third shorter than the 3d, 5th and following about equal to the 3d, gradually thinner, 11th not at all divided.

Prothorax rounded, punctuation of sides finer and denser than on the disk, base and apex nearly truncate; scutellum transverse; elytra parallel, rounded at tip, humeri nearly rectangular rounded, sides perpendicularly deflexed, lateral margin distinct, epipleuræ narrow, well defined, extending to the sutural tip.

Prosternum not wide between the coxæ, which are small, not prominent, cavities angulated, closed behind; middle coxal cavities widely open externally, mesosternum wide, truncate behind; episterna of metathorax pointed behind, epimera prolonged to meet the ventral segments, of which the 1st is longer, and the others equal, the 5th subtruncate (♂). Legs slender, thighs pedunculate and clubbed, tibial spurs small; tarsi broad, 1st joint of hind pair one-half longer than the 2d.

This tribe has affinities with the Callidiini, but differs not only by the shorter 2d joint of antennæ, but by the front coxæ being inclosed behind, and from all other tribes by the epipleuræ extending in equal width, and horizontally inflexed from base to tip.

**513. *H. marginata*.** Nigra opaca, dense punctata, brevissime albobubescens, prothorace rotundato latitudine paulo brevior, margine basali apicali, vittisque indistinctis tribus rubris; elytris margine basali laterali, usque ad suturam rubro, macula elongata laterali pone humeros nigra. Long. 9 mm.

One male, Marin County, California, Mr. Edwards. The lateral spot is in the red margin, and reaches from the base for one-fifth the length of the elytra, extending also upon the epipleuræ.

**514. *H. Helena*.** Late coccinea opaca, subtiliter pubescens, prothorace confertim haud profunde punctato, guttis duabus nigris ornato; elytris obsolete sed grosse punctatis, guttis utrinque tribus nigris ornatis, 1ma submarginali pone basin, 2da subsuturali ante medium, 3ia discoidali pone medium; ore antennis, pedibus, trunco, abdomineque nigris. Long. 8 mm.

Mariposa, California; for this lovely little species I am indebted to Mr. Thevenet, of Paris; it was collected by his brother, Dr. Thevenet, now living in California. The scarlet

color is singularly bright; the sculpture of the elytra is curious, being composed of large closely placed punctures, so shallow as to appear obliterated.

**CALLICHROMA LATR. (emend. SERV.).**

**515. *C. cobaltinum*.** *Læte cyaneum, prothorace transversim minus rude rugoso, antennis pedibusque nigris, femoribus posticis abdomineque ferrugineis.* Long. 25—36 mm.

Cape San Lucas, Lower California. Related to the Texan *C. plicatum* Lec., but the transverse rugæ of the prothorax are not so coarse, the anterior transverse constriction more regular and stronger, the color of a beautiful blue (not green), and finally the front and middle thighs are black.

**SCHIZAX LAC.**

Body elongate, clothed with short coarse pubescence, flying hairs sparse at the base of the antennæ and legs; head rather small, front short, deeply impressed transversely; mandibles obtuse and subemarginate at tip, though the outline is concealed by the pubescence; genæ short, rounded; eyes large, finely granulated, broadly divided, lobes nearly equal in size, rounded triangular; palpi stout, short, last joint truncate, impressed; antennæ (♂) twice as long as the body, ♀ about one-third longer than the body, slender, punctured, and pubescent, with a few flying hairs near the base, 11th joint longer, slightly curved at the tip in both sexes. Prothorax narrowed in front and behind, with an acute lateral spine one-third from the base. Scutellum moderate in size, elongate, triangular, acute; elytra parallel, broadly rounded at tip. Prosternum broad between the coxæ, which are not angulated externally; mesosternum broad, protuberant, truncate behind, coxal cavities open externally; metasternum with side pieces rather broad, scent pores distinct. Ventral segments slightly diminishing in length. Legs slender, hind pair longer; hind thighs ♂ extending to the tip of the elytra; hind tarsi with the 1st joint, as broad as, and equal to, the two following united.

Remarkable in the group of Tyloses for the divided eyes, which have suggested the generic name.

**516. *S. senex*.** Niger opacus, pube brevi minus subtili cinerea vestitus, prothorace fortius, elytris subtilius punctatis, his margine suturali laterali apicali et scutello fulvo-pubescentibus. Long. 13—17 mm.

Arizona, collected by Drs. Horn and Palmer; the rapidity of flight of this insect is wonderful. The pubescence of the elytra is less dense than that of the under surface, and not evenly distributed, so as to give a mottled appearance. The outer condyle of the thighs is elongated into a short obtuse process.

### CROSSIDIUS Lec.

The species of this genus vary greatly in color, and are somewhat difficult to recognize by the scattered descriptions heretofore published. I have constructed the following table to enable them to be more easily identified:—

**A. Prothorax subquadrate;**

Black clothed with long gray hair; elytra very densely punctured, punctures very coarse at the base, becoming finer behind; front tibiae with a dense brush of hair on the inner side. Utah; Eastern California.

**1. *ATER* Lec.**

**B. Prothorax rounded and subtuberculate on the sides;**

a. Elytra very coarsely punctured towards the base, punctures becoming smaller behind;

Head, antennae, and legs black; under surface and pronotum black or rufous; elytra rufo-testaceous with basal margins and sutural blotch black, the latter usually narrow or wanting in ♂, broad in ♀.

**2. *PUNCTATUS* n. sp.**

Testaceous, antennae fuscous, legs ferruginous; elytra with two costae more distinct than in the other species. Colorado Desert.

**3. *TESTACEUS* Lec.**

Testaceous, antennae fuscous, legs ferruginous; elytra without costae, suture black, broader in ♀. Arizona.

**4. *INTERMEDIUS* Ulke.**

Smaller; antennae, legs, and head black; under surface yellow, trunk frequently, abdomen rarely blackish; pronotum more or less black; elytra yellow with humeral spot and sutural blotch more or less dilated, black. Colorado and New Mexico.

**5. *PULCHELLUS* Lec.**

b. Elytra less coarsely punctured, punctures smaller towards the tip;

Black, abdomen usually ferruginous; elytra rufo-testaceous, with basal margin, and usually the whole of the suture black, the blotch never very much dilated; front tibiae with a dense brush of hair on the inner side. Oregon.

**6. *HIRTIPES* Lec.**

**C. Prothorax rounded on the sides, not angulated;**

Dull testaceous, densely pubescent; punctures of elytra dense, finer behind, a short humeral vitta black, which in one specimen has a continuation near the tip (indicating that it may be entire in some individuals). New Mexico.

7. *HUMERALIS* Lec.

Bright red, antennæ, legs, postpectus, and head black; elytra coarsely punctured, punctures denser and somewhat smaller behind, basal band and sutural blotch black, the latter very broad in both sexes. Colorado.

8. *DISCOIDEUS* (Say).

**517. *C. punctatus*.** Niger, pube longa pallida vestitus, prothorace lateribus rotundatis medio angulatis, dense punctato, sæpe rufo; elytris grosse punctatis, punctis postice minoribus, rufo-testaceis, margine basali maculaque elongata suturali plus minusve dilatata nigris; subtus niger vel testaceus. Long. 13—17 mm.

Oregon, Lord Walsingham; California, Dr. Horn. Easily recognized by the coarser punctures of the elytra; the sutural blotch varies greatly; in one ♂ it is a very narrow line, in two others it is a large, oval, elongate spot; in two ♀ it is broader, with the sides straight and parallel.

6. *C. hirtipes* Lec., Proc. Acad. Nat. Sci. Phila., vii, 16. *C. suturalis* Lec., from New Mexico, is perhaps a local variety of this species, but the prothorax is less densely punctured, the basal margin of the elytra is not black, and the body beneath is rufo-testaceous, the hind tibiæ are a little sinuate on the inner side, and the hind tarsi rather broader, with the 1st joint less elongated in the single ♀ in my collection.

8. *C. discoideus*; *Callidium discoideum* Say, Journ. Acad. Nat. Sci. Phila., iii, 411; *Crossidius pulchrior* Bland, Proc. Ent. Soc. Phila., i, 272; this beautiful little species represents in miniature the red variety of *C. punctatus*; the sutural blotch is broad, with parallel sides, and extends to the side margin by curving outwards about one-fifth the length from the tip.

#### CYLLENE Newm.

**518. *C. brevipennis*.** Nigro-picea, cinereo-pubescent, prothorace obscure ferrugineo, lateribus rotundato, versus basin utrinque vix excavato; elytris fasciis tribus angustis, base apiceque late testaceis, flavo-pubescentibus, antennis pedibusque ferrugineis; abdomine elytris multo longiore. Long. incl. abd. 18; excl. abd. 12.5 mm.

One specimen; Utah, collected by Dr. Leidy. The base of the prothorax is not excavated each side and the prosternum is not perpendicular behind; the species is easily recognized by

the length of the abdomen, as well as by the fasciæ of the elytra being less numerous than in the allies of *C. pictus*, and by the prothorax not being fasciate.

### **CLYTUS LAICH.**

**519. *C. lanifer*.** Niger, flavo-pubescent, prothorace elytrorumque basi et sutura longius flavo-villosis, illo latitudine paulo longiore, basi constricto, lateribus subangulatis rotundatis, postice sinuatis, dense grosse punctato, linea brevi dorsali lævi; elytris sutura, fasciasubbasali, altera transversa ad medium, 3iæque obliqua ante apicem flavis; scutello dense flavo-villoso; tibiis tarsisque ferrugineis. Long. 14 mm.

Owen's Valley, California; Dr. Horn. In the ♂ the antennæ are a little more than half the length of the body, and the front tarsi are much broader than in the ♀. The prothorax is quite distinctly tubularly constricted, and sinuate on the sides near the base; the hind tarsi are less slender than in *C. marginicollis*; the 1st joint is longer than the 2d and 3d, but not as long as all the others united. The front is short and rounded as in that species. It belongs to the Ochrestes group, but differs from any of the Mexican species which are thus far described.

### **XYLOTRECHUS CHEVR.**

The markings of the elytra in all the species of this genus may be reduced to an elementary form, consisting of a scutellar spot, an arcuated band extending along the suture to a little in front of the middle; an oblique band behind the middle, and the apical margin, which are covered with pale or yellow hair. In front of the arcuated band is inclosed a marking which is variable in form being sometimes (e. g. *colonus*) a slender sinuated transverse line; sometimes, as in most of the species, a spot; sometimes as in the three following species a line, directed inwards and backwards, but reaching neither margin nor suture. The bicarinated frontal elevation also differs in form in the different species, and affords good characters for distinguishing them.

**520. *X. convergens*.** Fusco-piceus, cinereo-pubescent, prothorace latitudine sublongiore, asperato, lateribus late rotundatis, basi tubularim constricto disco plagis 4 flavo-pilosis ornatis; elytris apice late rotundatis, breviter mucronatis, sutura tota, linea hamata a basi ad medium juxta suturam extensa, dein extrorsum antice curvata, strigam obliquam tenuem includente, linea tenui pone medium extrorsum retrover-



gente, margineque apicali tenui pallide flavo-pilosis; antennis pedibusque (clava femorali excepta) ferrugineis; fronte flavo-pilosa, umbone elongata, plana, argute marginata, antice acuta. Long. 11 mm.

Ohio, one specimen, which I owe to the kindness of Mr. H. Ulke. A very distinct species by the elytral markings, which are narrow lines of mixed yellow and white hairs, and consist of the entire suture, the usual curved fascia concave forwards about the middle, an oblique line behind the middle, and the apical margin; in front of the curved fascia is an oblique line running inwards and backwards from the humerus, but not attaining either the margin or the sutural line. The four thoracic spots of yellow hair are placed, two transverse ones on the front margin, and two discoidal behind the middle. The femora are strongly clubbed, and the hind pair extend to the tip of the abdomen.

**521. X. insignis.** Nigro-piceus pubescens, fronte, oculorum sinibus, prothorace margine apicali et basali, elytris maculis solitis latis flavo-pubescentibus, macula antica inclusa retrorsum intus obliqua; prothorace rotundato, basi tubulatum constricto, subtiliter muricato; elytris apice rotundatis; frontis umbone bicarinata, antice subacuta, subtus maculis et fasciis flavo-pubescentibus. Long. 20 mm.

California, Dr. Horn. Our largest and most conspicuous species; easily known by the wide bright yellow markings, which consist of: frontal spot, emargination of the eyes; front and hind margins of prothorax, (the former almost interrupted at the middle); a basal spot near the scutellum, and joining the yellow hind margin of that part; a curved band commencing behind the scutellum, running along the suture nearly to the middle, then transverse and slightly curved forwards to the margin; a slightly oblique band behind the middle, and a broad apical margin; beneath, side spots of the pro- and metathorax, the posterior half of the episterna of the metathorax, four broad bands on the ventral segments, and the whole of the 5th segment are similarly clothed with dense yellow pubescence.

**522. X. obliteratus.** Nigro-piceus cinereo irratus, prothorace magis rotundato, subtilius asperato, basi haud tubulatum constricto; elytris maculis solitis angustis testaceis indistinctis, macula antica inclusa retrorsum intus obliqua; elytris apice rotundatis, umbone frontali latiore, antice obtusa, medio canaliculata, haud acute bicarinata; subtus immaculatus. Long. 15 mm.

Colorado, two specimens; the markings of the elytra seem to be precisely as in *X. insignis*, but are narrow, and the black ground is sprinkled with short cinereous hair. The prothorax is more rounded on the sides, and not at all constricted at base.

This species is sometimes placed in collections as *X. mormonus* Lec., to which it has a strong resemblance in form, and by the indistinct markings, but differs by the asperities of the prothorax being very much finer, and by the frontal umbo, which in *X. mormonus* is broader, more acute in front, flat on the main surface, and margined by two sharp well-defined distant carinæ. The thighs are strongly clubbed, but do not extend to the tip of the abdomen.

#### **NEOCLYTUS** THOM.

*N. muricatus*; *Clytus* mur. Kirby, Fauna Bor. Am. iv. 177  
= *C. leucozonus* Gory and Laporte, Mon. pl. xvii, f. 105.

**523. *N. torquatus*.** Fusco-piceus pubescens, elongatus, prothorace latitudine longiore, carinulis brevibus transversis, serie triplici sitis, (quarum antica media major est), margine apicali et basali, fasciæque transversa ad medium flavo pubescentibus; elytris apice breviter acuminatis, basi fasciisque tribus flavo-pubescentibus, antica a sutura paulo ascendente, alteris retrorsum obliquis; subtus flavo-fasciatus, antennis pedibusque ferrugineo-fuscis, femoribus anticis dente subapicali spiniformi armatis. Long. 11 mm.

One specimen from Texas kindly sent me by Mr. A. Sallé. This species has the same form as *N. erythrocephalus*, but differs by the coarser sculpture of the prothorax (which is also less rounded on the sides), and by the bands of yellow pubescence; on the elytra the two hinder bands are more oblique backwards from the suture, and the front one is directed as much forwards in this species, as it is backwards in *N. erythrocephalus*. The front thighs are armed beneath on the posterior margin at the tip with a long slightly curved spine, represented in allied species, in the form of an obtuse slightly prominent tooth; the hind thighs extend to the tip of the abdomen.

*N. longipes*; *Clytus* long. Kirby, Fauna Bor. Am. iv, 176. I have seen this species in Parisian collections named *N. fulguratus* Thomson. It appears to be rare in the North, but more frequent in Texas; the dark-ground color of the elytra is sometimes thinly suffused with white pubescence, especially towards the base.

**524. *N. balteatus*.** Fusco-piceus, pubescens, prothorace latitudine paulo brevior, lateribus rotundatis, apice marginato, basi paulo angustiore, carinulis brevibus transversis serie media ornato, lateribus inordinatim asperatis, disco medio elevato, utrinque oblique declivi, fascia apicali basali et media (interrupta et saepe deficiente), flavo-pubescentibus; elytris apice breviter acuminatis, fasciis tribus, margine apicali, scutelloque flavo-pubescentibus; subtus flavo-pubescent, prothoracis lateribus, episternis metathoracis antice, coxisque omnibus obscuris; antennarum basi pedibusque ferrugineis. Long. 14 mm.

Oregon; collected by Lord Walsingham. Of the same form as *N. erythrocephalus*, with the short carinae of the prothorax fewer and less developed, the front one of the medial series being longer but scarcely higher than the others, the apex is distinctly margined; the middle fascia of the prothorax is feeble in one specimen, and slightly interrupted in the other, the apical and basal fasciae are broad, and unite beneath at the prosternum. The elytral fasciae are broad, the first and second are straight and transverse, the 3d inclines slightly backwards from the suture. The under surface is covered thickly with yellow hair in ♂, except on the flanks of the prothorax, and the front half of the side pieces of the metathorax; in the ♀ the yellow hair is much thinner, and the ground color appears to be ferruginous. The hind thighs of the ♂ extend beyond the tip of the abdomen, but not in the ♀.

**525. *N. interruptus*.** Fusco-piceus, pubescens, prothorace latitudine longiore, lateribus late rotundatis, apice marginato, basi angustiore, carinis transversis tribus ornato, 1mo pone apicem longiore, alteris pone medium brevibus, dense punctato et parce asperato, gutta parva basali media flavo-pubescente; elytris apice singulatim rotundatis, fasciis tribus scutelloque flavo-pubescentibus; 1ma nec marginem nec suturam attingente, 2da et 3ia marginem non attingente, hac obliqua; subtus obscure ferrugineus, episternis metathoracis postice, segmentoque ventrali 1mo flavo-maculatis. Long. 10 mm.

One specimen; California, collected by Mr. J. Behrens, and communicated to me by Dr. Horn. This species is also allied to *N. erythrocephalus*, and in well-preserved specimens the markings beneath would perhaps be similar; but in the one examined there are only two spots of yellow pubescence on each side; one on the hind part of the metathoracic episterna, the other at the side of the 1st ventral segment on its hind margin.

14 June, 1873.

**EUDERCES** LEC.

**526. *Eu. Reichei*.** Piceo-ferrugineus, pilis longis erectis parvis vestitus, prothorace latitudine longiore, punctato, apice lævi, lateribus paulo rotundatis, basi late tubulatim pedunculato; elytris striga eburnea transversa haud obliqua ornatis, ante medium punctatis asperatis, basi paulo gibbosis, pone medium nigris politis. Long. 4—5 mm.

Texas; two specimens. I saw this species in the Oxford museum, and adopt the name there appended to it with great pleasure, as a deserved compliment to my excellent friend Mr. L. Reiche of Paris. It is smaller than *Eu. picipes*, and is easily distinguished from similarly colored varieties of that species by the prothorax being smooth near the apical margin, and not longitudinally plicate, but only punctured on the rest of the surface; the elytra are similarly sculptured, but the sub-basal tubercles are less developed, and the ivory band is exactly transverse, and not directly slightly backwards, as in that species. The antennæ are not spinose.

*Eu. pini* Fitch; *Call. pini Oliv.*, *Cl. piniadens Fabr.*, *Gory*, and *Lap.*, incorrectly referred by Lacordaire to *Tillomorpha*, is closely allied to *Eu. picipes*, and varies in color in the same manner; the prothorax is plicate, smooth at the apex for a long distance as in *Reichei*, but the sides are rounded in a different manner from the other two species, being more prominent and subangulated at the middle. The elytra are velvety for a space behind the ivory band, which is slightly oblique as in *picipes*, but the sub-basal elevation is more developed, and there is an oblique band of silvery hair at one-third from the apex, which is frequently accompanied towards the suture by a shorter line placed in front of it.

The eyes are completely divided as in the other species, but the upper lobe is much smaller, and reduced in fact to a very few lenses, thus approaching the genus *Tillomorpha*, in which the upper lobe is entirely wanting.

**527. *Eu. parallelus*.** Niger, prothorace longitudinaliter plicato, latitudine paulo longiore, ovato, lateribus rotundatis, basi multo angustiore; elytris confertim postice subtilius punctatis, usque ad medium velutinis, fasciis duabus eburneis transversis rectis parallelis ante medium signatis, anteriore intus abbreviata; antennis haud spinosis. Long. 5 mm.

Lower California, Mr. Ulke. Very different by the double elytral ivory fasciæ, which are transverse, not at all oblique.

The anterior one extends from the suture to the outer third, the hinder one is entire. The eyes are completely divided, as in the other species of the genus, with the upper portion small, narrow, and oval.\*

**ZAGYMNUS** Lec.

**528. *Z. clerinus*.** Niger, pube erecta pallida sat dense vestitus; supra confertim fortiter punctatus, capite thoraceque rubris; elytris parallelis, apice rotundatis sutura prominula, macula subscutellari fasciisque duabus latis aurantiacis, his ad suturam interruptis et ad marginem conjunctis; subtus nitidus punctatus. Long. 13 mm.

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\* It is proper to note here the occurrence in Texas of *Gnaphalodes trachyderoides* Thoms., a remarkable Mexican species. The genus belongs to Group II of Cerambycini, and would be properly placed in the table (Classif. 302) before *Chion*, with the following definition:—

Prothorax with lateral spine behind the middle; antennæ densely fringed beneath, inner angle of joints 4-7 spinose; elytra bispinose at tip; episterna of metathorax wide, scent pores distinct. **GNAPHALODES.**

The scutellum is triangular, larger than in *Chion*, and the eyes are less coarsely granulated: the prosternum is perpendicular behind, and the mesosternum convex. The body is brown, uniformly clothed with gray-brown pubescence, paler and more dense on the scutellum.

***Anelius prolixus*.** Piceus, dense breviter cinereo-pubescoens et pilis raris volatilibus pilosus, prothorace punctato, fere cylindrico, latitudine ongior, linea transversa tenui ante medium, tuberculoque utrinque prope basin ornato; elytris thorace latioribus, punctatis, punctis positæ subtilioribus, alterisque majoribus piliferis intermixtis, apice longe bispinosis; antennarum articulis 3-6 spina brevi armatis. Long. 25 mm.

One pair, Cape San Lucas, Mr. Xantus. This fine species differs from the others by the antennæ being armed with small spines; they are very distinctly carinate, in the ♂ are nearly as long as the body, and in the ♀ scarcely two-thirds as long. The under surface and legs are finely pubescent, and speckled with darker punctures from which proceed the flying hairs. The 5th ventral of the ♂ is slightly truncate, emarginate. The last joint of the palpi is elongate triangular, less dilated than in *A. volitans*, and transversely truncate; the appearance of a transverse line across the disk of the prothorax in front of the middle is the result rather of the arrangement of the pubescence than of a positive elevation; the tubercle each side is transverse, near the base, and nearer the side than the median line; there are a few large scattered darker punctures upon the sides.

This fine species was overlooked in my boxes until too late to print the description on p. 186, where it properly belongs.

One specimen from Florida, given me by Dr. E. Brendel; another in the collection of Mr. Ulke is entirely black. I have mentioned, on p. 321 of the Classification, some of the structural differences between this and *Agallissus gratus* (Hald.), which entitle them to rank as distinct genera; and which may be briefly summed up as follows: in *Agallissus Dalman*, front quadrate oblique, prothorax rounded on the sides; elytra gradually narrowed behind, broadly truncate, and serrate at tip, with the sutural spine quite prominent; body finely punctured above, smooth beneath: in *Zagymnus*, front short, vertical, prothorax longer than wide, feebly rounded on the sides; elytra parallel, not narrowed behind, rounded at tip, with the sutural spine small, body very coarsely punctured above, moderately punctured beneath.

The narrow epipleuræ are in this tribe suddenly and strongly sinuate near the base, a singular character, which attracted my attention before I was acquainted with the description of *Dalman*, and induced me to place the only species known to me as a distinct primary group of the subfamily Cerambycidae.

#### **NECYDALIS** LINN.

**529. *N. cavipennis*.** Elongatus, nigro-vel rufo-piceus, pube longa sericea flava dense vestitus, prothorace latitudine longiore, antice posticeque profunde constricto, lateribus bisinuatim medio obtuse tuberculatis, disco parce punctato, linea dorsali profunda utrinque abbreviata; elytris testaceis base apiceque fuscis, alutaceis, vix punctatis, planis, apice subito elevatis et tumidis, margine laterali paulo elevato; pedibus sæpe ferrugineis, antennis crassiusculis, articulo 4to contiguus sesqui brevior. Long. 18—22 mm.

San Francisco, collected by Mr. J. Behrens. Of the same form as *N. lævicollis*, but easily known by the antennæ being stouter, with the 4th joint comparatively shorter; by the long and dense pubescence; by the prothorax (when the pubescence is abraded) being sparsely punctured, and by the elytra being impressed nearer the apex, and more suddenly concave. The color varies; one specimen is black, with exception of the disk of the elytra, and the peduncle of the thighs; in another the antennæ, legs, and elytra are ferruginous, with a dusky cloud on the latter.

#### **LEPTALIA** LEO.

This genus is established on *Anoplodera macilentia* Mann. It is allied to *Encyclops*, having nearly the same form of head, con-

stricted suddenly but slightly, far behind the eyes, which are finely granulated, and feebly emarginate on the inner side; the hind angles of the head are obtuse and rounded; the antennæ are long and slender, as in *Encyclops*, and the 4th joint is a little shorter than the 3d and 5th, they are inserted well up on the front, which is less vertical than in *Encyclops*, and the mouth is a little longer. The last joint of the palpi is triangular and obliquely truncate. The prothorax is narrower than the head, longer than wide, deeply constricted before and behind, and the sides are obtusely but strongly dilated. The elytra are wider than the thorax, elongate, parallel, feebly truncate at tip. Legs slender, tarsi long, 1st joint of all much longer than the 2d, of the hind tarsi the 1st and 2d joints are feebly sulcate, with a narrow line of pubescence each side; 3d joint of all the tarsi dilated and deeply bilobed, as in *Encyclops*.

The species is black, densely punctured, the head and prothorax more finely than the elytra. Varieties occur with yellow elytra, with the suture and broad sublateral vitta black; *A. Frankenhæuseri* Mann., is a variety in which the elytra have only the black vitta, and the legs are testaceous; *Leptura fuscicollis* Lec. is a larger variety from California, of still paler color, the body being testaceous, and the elytral vitta very indistinct.

#### **CENTRODERA** LEC.

**530. *C. nevadica*.** Fusco-testacea, helvo-pubescent, prothorace confertim subtiliter punctato, latitudine vix longiore, convexo, leviter canaliculato, antice posticeque constricto, tuberculis lateralibus obtusis; elytris thorace sesqui latioribus apice rotundatis, subtilius versus basin autem distinctius punctatis; antennis (♀) corporis  $\frac{3}{4}$  haud longioribus, articulo 4to 3to brevior, conjunctis 5to æqualibus. Long. 17 mm.

One female; Virginia City, Nevada, Mr. Edwards. By the obtuse tubercles of the prothorax this species resembles *C. sublineata*, but the punctuation is finer, the prothorax is scarcely narrower at tip than at base, and there is no appearance of lines on the elytra. The antennæ are shorter and stouter, but this is in part or in whole a sexual character, the ♀ of *C. sublineata* being unknown to me.

#### **XYLOSTEUS** FRIWALDESKY.

**531. *X. ornatus*.** Niger, capite thoraceque dense punctatis, elytris fortiter punctatis, maculis utrinque duabus flavis marginalibus ornatis, versus apicem sublavibus. Long. 14 mm.

One female, Oregon; collected by Lord Walsingham, and kindly given me by Mr. G. R. Crotch. The antennæ are about three-fourths the length of the body. This species resembles entirely the figure of the European *X. Spinolæ*,\* except that the basal and subapical spots of the elytra are wanting, and only the two marginal ones remain; these are transverse, and directed towards each other in a diagonal direction, and extend nearly one-half the breadth of the elytra. The genus is very closely allied to *Centrodera Lec.*, and differs only by the eyes being smaller, less transverse and less prominent, and by the sides of the head being prolonged behind the eyes, suddenly but feebly constricted at the base (somewhat as in *Encyclops*, etc., though to a less degree), instead of being obliquely narrowed to the neck. These differences are not generic in *Acmaeops*, nor is the form of the head and eyes constant in *Leptura*. I am therefore disposed to believe that the two genera are not sufficiently distinct. Those who agree to combine them will adopt the generic name *Xylosteus* as having many years priority over *Centrodera Lec.*

#### TOXOTUS SERV.

**532. *T. obtusus*.** Testaceus subtilissime pubescens, capite fusco, prothorace latitudine haud longiore, lateribus bisinuato, tuberculo laterali obtuse rotundato, disco convexo, antice et postice transversim modice constricto, vage canaliculato; elytris vix punctulatis, fere parallelis, apice rotundatis; oculis parvis, subtiliter granulatis. Long. 15 mm.

One denuded specimen from Yellowstone basin, Dr. Horn, and another well preserved in Mr. Ulke's collection. Differs from all the other species before me by the less deeply constricted prothorax and more obtusely rounded lateral tubercles; the eyes are smaller than usual, and finely granulated, but more convex than in *T. vestitus*, with which it agrees in this character; the 3d and 5th joints of the antennæ are equal, and the 4th is two-thirds as long; the head is feebly narrowed behind, but not rounded on the sides. The pubescence is extremely short and fine. The species of this genus are not alike in the eyes; in *T. cinnamopterius* they are much larger, and less finely granulated, than in any of the others.

\* Vide Du Val, Gen. Col. Eur., iv. pl. 56, f. 262.



**PACHYTA SERV.**

**533. *P. armata*.** Nigra, opaca, pube erecta villosa, capite thoraceque confertissime punctatis, hoc apice et basi profunde constricto, basi multo latiore, spina laterali valida elongata, apice rotundata; elytris basi prothorace multo latioribus, postice sensim valde angustatis, apice truncatis, nitidis glabris, flavo-testaceis, pone medium extrorsum oblique nigris, parce punctatis, punctis versus humeros asperatis. Long. 19 mm.

Oregon; Mr. Ulke. Related to *P. liturata* Kirby (nitens Lec.), but much broader, with entirely different sculpture, and with much longer thoracic spines; the humeral regions of the elytra are very prominent, and the disk is broadly concave inside of them; a broad oblique groove runs from below the humeral prominence on to the dorsum of the elytra where it is lost; the black space extends along the outer margin obliquely from just behind the middle to the sutural tip. The antennæ and other organs are as in *P. liturata*.

**534. *P. rugipennis*.** Nigra, subænea, pube brevi minus subtili parce vestita, antennarum, femorum tibiærumque basi ferruginea; elytris apice rotundatis, rude punctatis, et lineis elevatis fortiter reticulatis, fascia transversa cerina angusta ad medium ornatis. Long. 13—16 mm.

One pair, Canada. The male has the antennæ two-thirds as long as the body, and the elytra slightly narrowed from the base; in the female the antennæ are shorter, and the elytra broader, and parallel on the sides. The head and thorax are densely and coarsely punctured, the latter narrower in front, with the usual transverse constrictions before and behind; the lateral tubercle is acute; the disk is feebly foveate each side, and the dorsal line is narrow and somewhat channelled. The sculpture of the elytra is very peculiar, consisting of a reticulation of smooth, strongly elevated lines with the depressed spaces coarsely punctured, from the punctures proceed rather coarse golden hairs; at the middle there is a narrow transverse waxy band.

I have seen specimens of this insect in the British Museum under the names *P. rugipennis* †Newman, and *P. bimaculata* †Dej. I have adopted the former as being more applicable.

**ANTHOPHILAX Lec.**

**535. *A. tenebrosus*.** Niger, subnitidus, capite thoraceque confertim subtilius punctatis, hoc antice posticeque modice constricto, tuberculo laterali brevi obtuso; elytris (♀) thorace latioribus, parallelis apice rotundatis, antice parce fortiter, versus suturam et pone medium subtiliter punctatis. Long. 12 mm.

One female; southeastern California, Dr. Horn. Not unlike in form the stouter species of *Acmaeops*, but the eyes are larger, subtriangular, and strongly and broadly emarginate at the antero-interior side. The antennæ are a little more than half the length of the body, and stout; the 4th joint is two-thirds as long as the 5th, and a little shorter than the 3d. The punctures of the head and prothorax are rather fine, and the latter is not channelled. The elytra are somewhat shining, sparsely and not finely punctured at the base, and along the sides beyond the middle, the punctures becoming gradually finer towards the suture and behind, where the surface is nearly opaque.

*A. mirificus* Bland, is a much larger species, with much more coarsely punctured head and prothorax, the latter broadly channelled, and the elytra punctured and rugose before the middle, opaque and scarcely punctured behind. It is found in Colorado.

**ACMÆOPS Lec.**

I regret to say that owing to the want of sufficiently extensive sets of specimens I have unnecessarily multiplied the species of this genus, on slight differences in color, pubescence, or sculpture, which larger collections have shown to be merely individual, and not of specific value. With the increased material now accessible I would arrange the species as follows:—

A. Short stout species, with the head narrowed behind but not constricted, antennæ rather stout (except in thoracica), with the 4th joint distinctly shorter than the 5th; elytra of ♀ somewhat dilated on the sides.

a. Prothorax with the lateral angle distinct, sides, therefore, behind the middle concave in outline;

Black, prothorax yellow, densely pubescent, elytra densely punctured; base of tibiae yellow, var. *incerta* Bland. 1. *THORACICA* (Hald.)

Color variable, very slightly pubescent, elytra sparsely punctured, punctures larger towards the base. a. Thorax with two black spots, or black disk; elytra yellow with two black vittæ, legs yellow or black, *bivittata* Say. β. Yellow, head and elytra black, antennæ dusky, base testaceous

- nigripennis* Lec.  $\gamma$ . Black; varies with 1, legs yellow; 2, prothorax yellow; 3, prothorax yellow with two black spots, *varians* Lec.  $\delta$ . Testaceous, head dusky, *fusciceps* Lec.
2. *BIVITTATA* (Say).  
Blackish-blue, elytra more coarsely and sparsely punctured (pubescent?) lateral angle of prothorax obtuse but less prominent. 3. *ATRA* Lec.  
Greenish-bronze, pubescent, elytra coarsely and sparsely punctured (general form less stout, and lateral angle of prothorax more rounded, and less prominent).
4. *SUBNEKA* Lec.  
b. Prothorax with the lateral angle rounded, not prominent, sides straight and parallel behind;  
Testaceous (feebly pubescent?) punctures of elytra irregular toward the base.
5. *PINGUIS* n. sp.  
Dark metallic, pubescence soft and long, elytra more densely punctured, more finely towards the tip. Varies, dark-blue, *tumida* Lec.; black, *lugens* Lec.; blue with longer and better preserved pubescence, *molli-pilosa* Lec.; dark testaceous, sides blackish-bronze, *fusca* Lec. Smaller, elytra less densely punctured, *californica* Lec.; with elytra brighter blue, *subcyanea* Lec.
6. *TUMIDA* Lec.  
B. More elongate species, antennæ on a line with the front margin of the eyes, slender, 4th joint scarcely shorter than 5th; prothorax campanulate, constricted before and behind, hind angles frequently prominent, tarsi longer and more slender, with 3d joint rather more broadly bilobed; 1st and 2d joints of hind tarsi not brush-like beneath, (precisely as in *Leptura*).  
a. Disk of prothorax convex, channelled; elytra rounded at tip; hind angles of head obtusely rounded except in 10 and 11;  
Prothorax wider than long;  
Hind angles not prominent, elytra more densely punctured, with a red humeral spot.
7. *MILITARIS* Lec.  
Hind angles distinctly prominent, elytra less densely punctured, black sometimes testaceous. a. Elytra with testaceous vittæ, *dorsalis* Lec. *Subpilosa* was founded on abraded specimens; *lupina* Lec., on one in which the long pubescence is preserved.
8. *SUBPILOSA* Lec.  
Prothorax longer than wide, more strongly constricted in front;  
Elytra more sparsely punctured;  
Sides of head parallel behind the eyes. a. Elytra entirely black.  
b. Elytra with testaceous vittæ.  $\gamma$ . Elytra testaceous, margin black, *marginalis* Lec.
9. *LONGICORNIS* Kirby.  
Sides of head oblique behind the eyes; hind impression of prothorax deeper;  
Prothorax more densely punctured.
10. *VINCTA* Lec.  
Prothorax shining, less densely punctured.
11. *LIGATA* n. sp.  
Elytra more densely punctured with short pubescence, base red; head and prothorax clothed with golden hair, the former feebly, the latter strongly constricted at base.
12. *BASALIS* n. sp.

b. Disk of prothorax convex not channelled, sparsely and finely punctured, elytra rounded at tip;

\* Sides of head behind the eyes straight, oblique; neck concave:  $\zeta$  with the front tibiae armed on the inner side with an obtuse tooth at the middle, outline concave from the tooth to the tip.

Testaceous, elytra coarsely punctured, with the suture, dorsal vitta and side margin (the latter sometimes interrupted into spots) black; *quadri-vittata* Linn. (fide Hald.).

13. *DIRECTA* Newm.

\*\* Sides of head behind the eyes tumid, rounded, smooth, prothorax more deeply constricted behind; ( $\zeta$  ?)

Black, with fine hoary pubescence, mouth and prothorax ferruginous.

14. *FALSA* Lec.

c. Disk of prothorax more or less flattened behind, and prolonged or elevated each side into a tubercle; elytra truncate at tip.

Prothoracic tubercles conical lateral; black, elytra opaque, base and side margin and sometimes the suture bright red.

15. *DISCOIDEA* (Hald.).

Prothoracic tubercles dorsal obtusely rounded; black, elytra shining, more distinctly punctured, black, striped, testaceous, or fuscous.

a. Tubercles less developed, *gibbula* Lec.

16. *PROTEUS* (Kirby).

C. A moderately stout but small species, with the front and mouth extremely long, the antennae inserted in front of the line joining the anterior margin of the eyes; prothorax campanulate, constricted in front, wider and feebly constricted behind: tip of elytra truncate.

Black, elytra black, fuscous, or testaceous, sometimes with a dorsal vitta and tip fuscous, *strigilata* Fabr., *longiceps* Kirby, *fulvipennis* Mann.

17. *FRATERNIS* Laich.

**536. *A. pinguis*.** Fusco-testacea, pallide pubescens, obesa, prothorace latitudine brevior, lateribus postice parallelis, antice rotundatis, apice angustiore constricto, confertim punctato, spatio dorsali praecipue postice laevi; elytris latioribus convexis, parce punctatis, punctis postice subtilioribus, versus basin autem irregularibus, vittis indistinctis sublaevibus relictis. Long. 9 mm.

One specimen; California, Dr. Horn. A very stout species, shaped like *A. bivittata*, but with the sides of the prothorax straight and parallel behind the middle, as in *A. atra*, and quite distinct from them as from all others by the punctures of the basal half of the elytra being arranged so as to give the appearance of faint longitudinal stripes, of which the inner one runs obliquely forwards towards the humerus, so as to tend to unite with the others. The antennae and legs are dark piceous, the former rather stout, with the 3d and 4th joints equal.

**537. *A. ligata*.** Nigra nitida, breviter parce pubescens, elongata, capite confertim punctato, pone oculos oblique angustato, et late rotundato, prothorace latitudine longiore, antice et postice profunde constricto, dorso canaliculato, utrinque convexo, minus dense punctato, vitta dorsali lævi, lateribus subangulatis, angulis posticis paulo prominulis; elytris thorace latioribus apice rotundatis, profunde haud dense punctatis; antennis tenuibus elongatis. Long. 8—12 mm.

*α.* Elytris vittis duabus obliquis testaceis, interiore postice, exteriori antice abbreviata; antennis pedibus plus minusve testaceis.

*β.* Elytris testaceis, sutura nigricante; antennis pedibus plus minusve testaceis.

Montana; this species is closely allied to *A. longicornis* and *vineta*; but is distinguished from the former by less robust form, and by the head being obliquely narrowed behind the eyes, and from both by the prothorax being less densely punctured, more shining, and more constricted, especially at the base; the pubescence in all three is very short and sparse.

**538. *A. basalis*.** Nigra, capite thoraceque dense punctatis aureo-pilosis, hoc antice posticeque constricto, lateribus obtuse tuberculatis, vel potius bisinuatis, linea dorsali lævi; elytris thorace latioribus, elongatis fere parallelis, apice subtruncatis, parce breviter albo-pubescentibus, punctatis, punctis postice subtilioribus, fascia basali rubra parcius punctata, femoribus anticis ferrugineis. Long. 10 mm.

California; Dr. Horn. A slender species, proportioned somewhat like *A. longicornis*, but with the elytra more flattened, and more densely punctured. The head is gradually narrowed behind the eyes, as usual, but is very distinctly constricted though not strongly at base, showing thus an affinity with the *Encyclops* tribe; I should be disposed to place it in that tribe, next to *Leptalia*, but the mouth is too long, and the front not sufficiently vertical to warrant it.

#### **STRANGALIA** SERV. emend. Lec.

The poriferous system of the antennæ is contained in small oval spaces, situated near the tip of the 6th and following joints, the 11th joint is not appendiculate, and has but one sensitive space each side, and not two, as in *Typocerus*; but in species 5 and 6 there is in ♂ an attempt at a double system of impressions on the 6th and following joints.

A. Body very elongate; 5th ventral of ♂ very deeply excavated, so as to appear emarginate, lateral lobes thin, expanded; (elytra not fasciate).

\* Hind tarsi with third joint scarcely emarginate;

Ferruginous, antennæ thicker; elytra more coarsely punctured with pale sutural markings, (4th ventral ♂ with a broad apical impression). Texas.

1. *VIRILIS* n. sp.

\*\* Hind tarsi with 3d joint strongly emarginate;

Above testaceous, head sometimes fuscous, antennæ blackish, slender; prothorax with two broad black vittæ, elytra less coarsely punctured, with black marginal spots; beneath usually dark, abdomen sometimes, and legs partly, testaceous. (Varies entirely black, also entirely pale, with the antennæ, and parts of the legs dark). Atlantic States.

2. *FAMELICA* Newm.

Black, elytra more coarsely punctured, pale, with margin and suture blackish; tip less acuminate, and more distinctly truncate than in the preceding, than which it is smaller and more slender. (Varies entirely black.) Middle States.

3. *ACUMINATA* (Oliv.)

B. Body very elongate, 5th ventral of ♂ more or less excavated, but not emarginate, lateral lobes not, or only moderately, expanded; 3d joint of hind tarsi emarginate;

Ferruginous, elytra with two transverse testaceous bands. Florida.

4. *STRIGOSA* Newm.

Rufo-testaceous, prothorax with two vittæ, elytra with three transverse bands black; hind thighs black at the tip. Atlantic States.

5. *LUTEICORNIS* (Fabr.)

Ferruginous, elytra black. Atlantic States.

6. *BICOLOR* (Swed.)

C. Body less elongate, 5th ventral of ♂ only triangularly impressed; 6th joint of antennæ without sensitive spot.

Ferruginous, elytra paler, with three large spots extending from the margin nearly to the suture. Atlantic States.

7. *6-NOTATA* Hald.

**539. *S. virilis*.** This species resembles in form *S. strigosa*, but is larger (15—19 mm.); the color above is ferruginous brown, thinly clothed with fine yellow pubescence. The antennæ (♂) are stouter than in any other species, and are about two-thirds the length of the body. The prothorax is one-third longer than the basal width, gradually narrowed in front, very feebly sinuate on the sides, not impressed behind, densely punctured with two fuscous badly defined vittæ; elytra acutely acuminate behind, and slightly dehiscent, extending to the tip of the 3d segment, more coarsely and less densely punctured than in *S. famelica*, with a scutellar spot, and two sub-sutural triangular ones connected along the suture, paler testaceous, and covered with yellow hair. Beneath fuscous, legs ferruginous, outer half of hind

thighs, tibia, and tarsi fuscous. The sexual characters are more strongly developed than in any other species in our fauna. The 5th abdominal ring is much swollen, the dorsal segment convex, the ventral one very deeply excavated, with the sides laminate, broadly impressed externally, and obtusely pointed at the end; the excavation occupies not only the whole of the under surface of the segment, but extends over half of the 4th ventral, as a shallow impression; the hind tibiæ are thickened at the outer end, and acutely carinate on the inner margin for the lower third; the 3d joint of the hind tarsi is nearly one-half as long as the 2d, and scarcely emarginate. Texas.

**TYPOCERUS** Lec.

The species of this genus have not been increased since the publication of my first memoir on Cerambycidae; but as the study of typical specimens in the British Museum has enabled me to arrange definitely the synonymy of Mr. Newman's species, I have prepared the following table:—

- A. Antennæ black with the 6th and following joints with impressed poriferous spaces; prothorax not strongly rounded on the sides :
  - a. Prothorax very coarsely punctured
    - \* Prothorax margined before and behind with golden hair, legs ferruginous ;
    - Elytra acutely acuminate, chestnut colored, with indistinct yellow bands ; prothorax narrowed from the base, sides subsinuate ; 1. **BADIUS.**
    - Elytra less acutely acuminate, obliquely truncate, black, with three bands and two basal spots yellow. 2. **ZEBRATUS.**
    - \*\* Prothorax at base margined with grayish hair, legs and antennæ black ;
    - Elytra with a broad angulated yellow spot extending from the base to the side margin, inclosing the humeral angle. 3. **LUNATUS.**
    - b. Prothorax more densely, less coarsely punctured ; pubescence golden, denser at base and tip ; legs ferruginous ;
    - Elytra brown with four yellow bands, frequently imperfect or obsolete, tip sub-obliquely truncate, and feebly bispinose. 4. **VELUTINUS.**
    - Pubescence black, grayish at the base ; body entirely black, tip of elytra obliquely truncate, shortly acuminate. 5. **LUGUBRIS.**
- B. Prothorax strongly punctured, much rounded on the sides before the middle ; pubescence long, grayish, denser at the base, but not golden ; elytra with four yellow bands, more or less confluent, the anterior one basal, the 2d and 3d frequently connected near the suture ; tip subtruncate, not spinose ; legs ferruginous, antennæ brown :

Antennæ stouter, 6th joint of, with large impression in ♂.

6. *BRUNNICORNIS* n. sp.

Antennæ more slender, joints 3—5 longer, 6th without impression in either sex.

7. *SINUATUS*.

1. *T. badius* Newm. Entomologist, 69. This species resembles *T. velutinus*, in the color of the elytra, but has the prothorax very coarsely punctured as in *T. zebratus*. In form it is similar to the latter but the elytra are more obliquely truncate at tip and more acutely acuminate, and the sides of the prothorax are feebly sinuate. Specimens may perhaps occur with perfect yellow elytral bands, but in the individual before me only a few traces remain. One ♂ from Florida was kindly given me in exchange by the British Museum.

2. *T. zebratus* Lec. J. Acad. Nat. Sci., 2d, 1, 334. *Leptura zebrata* Fabr. Syst. El. 2, 364; *L. zebra* Oliv. *L. carolina* Weber, Obs. Ent. 91.

3. *T. velutinus*. *Leptura velutina* Oliv., 73, 3, 32. *L. fugax* Fabr. Syst. El. 2, 359. *L. tenuior* Kirby, Fauna Bor. Am. iv., 181; *L. nobilis* Newman / Entom. 69.

**540. *T. brunnicornis*.** Niger, pallide pubescens, abdomine pedibusque ferrugineis, prothorace latitudine paulo brevior, a basi antrorsum angustato, lateribus ante medium rotundatis, confertim fortiter punctato, basi densius pubescente; elytris punctatis, punctis postice subtilioribus, subtiliter pubescentibus, apice truncatis, nigris, fascia lata basali alterisque tribus flavis; antennis fuscis basi ferrugineis. Articulo 5to apice latiore, sequentibus impressis. Long. 10—13 mm.

Texas; three males; the 2d and 3d elytral bands are a little wider towards the suture, which they do not quite reach; the hindmost band is a spot, also wider towards the suture but attains neither it nor the side margin; the tip is truncate not at all toothed.

This species exactly resembles in form and sculpture *T. sinuatus*, but differs by the elytra being more shining, and less pubescent, and by the antennæ being stouter, with the joints 3—5 obviously less slender, the 5th distinctly dilated at the outer end like the following joints, all of which are furnished with sensitive spaces.

7. *T. sinuatus* Lec., l. c. 335, *Leptura sinuata* Newm. *Stenura 8-notata* Hald. Varies greatly, the bands of the elytra being more or less developed, and the ground color either black or



brown; the dark portions tend to become confluent longitudinally between the side margin and the suture.

I have included under this name several forms which will be eventually placed as distinct species, but which I am unable at present to properly define, in consequence of want of sufficient material. They are follows:

- a. Antennæ of both sexes more slender than in the other forms, with moderately large sensitive spaces. Last ventral segment, in four specimens before me, subtruncate and slightly declivous at tip, anal plate simple, pygidium feebly emarginate; abdomen yellow in three specimens from the Middle States, dark in one specimen from Kansas; elytra yellow, with spots moderate in size, longitudinally confluent.
- β. Antennæ rather heavier than in α, longer in ♂, with moderately large sensitive spaces, shorter in ♀, with much smaller spaces. Last ventral segment of ♂ deeply excavated for nearly half its length; anal plate excavated and hairy, of ♀ subtruncate and feebly impressed, pygidium subtruncate in ♂, emarginate in ♀. Elytra in two specimens (♀) marked like the preceding, in three ♂ dark with narrow remnants of the yellow bands. Kansas.
- γ. Antennæ as in β, longer in ♂ with small sensitive spaces. Last ventral segment anal plate and pygidium of ♂, as in β; in ♀ with a transverse carina or plate near the tip; pygidium not emarginate; elytra castaneous, with faint traces of yellow spots, Indian Territory, Dr. Horn.
- δ. Antennæ as in β and γ, last ventral segment ♀ with a small elevated tubercle near the tip, pygidium not emarginate. Elytra with large spots, more or less confluent. Two ♀; Kansas.
- ε. Antennæ ♂, as in the preceding, but ferruginous, as are the legs and abdomen; last ventral feebly impressed as in ♀ of β, and pygidium very feebly emarginate. Elytra bright-yellow, with the spots clearly defined, the 1st and 3d forming bands. One specimen, Texas. (The pubescence seems shorter than in the other forms, but has been in great part abraded.)

#### **LEPTURA LINN.**

The species of this genus are very numerous, especially in the northern and northwestern parts of the continent, and may be conveniently arranged as follows:—

- A. Prothorax more or less triangular, or campanulate, widest at the base, hind angles prolonged; STENURA Serv.
- a. Prothorax strongly narrowed from the base, which is broadly but deeply bisinuate, posterior transverse impression distinct; elytra widest at the base, gradually narrowed behind, truncate and emarginate at tip, which is not margined;

- \* Antennæ feebly serrate; 5th ventral ♂ flattened, broadly truncato-emarginate, and bidentate; mouth short, hind angles of head more prominent;

Black, velvety pubescent, elytra red with the apex black;

Elytra not sulcate; prothorax sparsely punctured. 1. *EMARGINATA*.

Elytra sulcate; prothorax densely punctured. 2. *GIGAS* n. sp.

- \*\* Antennæ filiform; 5th ventral ♂ broadly truncato-emarginate and bidentate; mouth long, hind angles of head less prominent;

§ 1. Prothorax densely not finely punctured;

Elytra yellow, with anterior blotch (frequently wanting), medial band and apex black; feet varied black and yellow; sides and base of prothorax sometimes yellow, antennæ usually annulated;

Antennæ long and slender: α, tip of elytra ferruginous, *obliterata* Hald.;

β, tip of elytra black, *vitiosa* Lec. 3. *OBLITERATA*.

Antennæ stouter, not annulated, elytra with middle and posterior band black. 4. *SOROR* n. sp.

Elytra yellow, more obliquely truncate at tip, lateral spot near the middle, suture behind, and apex black; legs, antennæ, and body black.

5. *PROPINQUA*.

Elytra yellow, with vague medial and posterior bands interrupted at the suture, sides of prothorax, abdomen, and legs testaceous; tarsi, tip of posterior tibiae and hind femora fuscous; narrower than *obliterata* with the ♂ antennæ longer, and 11th joint very distinctly appendiculate, and prothorax more sinuate on the sides. 6. *DELETA*.

§ 2. Prothorax more finely punctured;

Black, elytra luteo-testaceous, tip blackish; 3d, 4th, and base of 5th ventral segments red; α, elytra black. 7. *PLEBEJA*.

More slender, antennæ annulate with yellow; ♂ black, base of legs yellow; elytra with base of epipleuræ yellow; and broad vitta dilated at base interrupted at the middle, and abbreviated at two-thirds the length; *subhamata* Randall, *interrupta* Newm., *armata* Hald.; ♀ testaceous, disk of prothorax, scutellum, suture, side margin, transverse spot at middle of elytra, and tip black; legs varied with black; varies with the prothorax marked only with a narrow black vitta, *elegans* Lec.

8. *SUBHAMATA*.

§ 3. Prothorax strongly less densely punctured;

Much broader and stouter, hind impression of prothorax very deep, abdomen red, base and tip blackish: ♂ black, abdomen red, *abdominalis* Hald.; ♀ yellow, occiput, two prothoracic spots, knees, tips of tibiae, and tarsi black, elytra with side margin and oblique vitta yellow, *atrovittata* Bland; varies with the trunk fuscous, and prothorax with the disk black. 9. *ABDOMINALIS*.

Broad, black, prothorax deeply impressed behind, elytra sanguineous, with a very broad common discoidal stripe not reaching the base, abdomen sanguineous. 10. *PLAGIFERA* n. sp.

Smaller, black, prothorax less deeply impressed; elytra with a spot near the base, two bands, and a spot near the tip yellow. 11. *AMABILIS*.

§ 4. Prothorax densely punctured, feebly impressed; form slender;

Prothorax not sinuate on the sides, fuscous finely pubescent; elytra testaceous, suture, dorsal vitta, and submarginal spots blackish; legs testaceous, antennæ annulate; *indirecta* Newm., *cincta* Hald., *lateralis* Lec.

12. *LINEOLA*.

Black, clothed with short yellow pubescence, elytra dark testaceous, coarsely punctured, tip sometimes black. 13. *RUBIDA* n. sp.

b. Prothorax nearly smooth, strongly and gradually narrowed from the base, which is bisinuate, hind impression very deep; elytra very coarsely punctured, not narrowed, very dehiscent, rounded, subacuminate, and distinctly margined at tip;

Black, sides of elytra, metathorax, and abdomen red; thighs red, with the tips black. 14. *CRUENTATA*.

c. Prothorax punctured, without hind impression, campanulate but subquadrate, hind angles small; elytra parallel, genæ very short; 5th ventral ♂ ♀ rounded at tip;

\* Elytra rounded and margined at tip;

Black, elytra blue, polished, coarsely and sparsely punctured, antennæ and legs either black or yellow. 15. *CHALYBEA*.

Black, head and prothorax bright rufous;

Elytra shining, very coarsely punctured, tip subtruncate; prothorax without impressions. 16. *CAPITATA*.

Elytra densely not coarsely punctured, tip rounded; prothorax impressed near the hind angles. 17. *AMERICANA*.

Black, hoary with fine white pubescence, prothorax dull red.

18. *HÆMATITES*.

Black with white pubescence, head and prothorax golden-pubescent; prothorax yellow with a black discoidal spot, front thighs and base of middle thighs yellow. 19. *SAUCIA*.\*

\*\* Elytra scarcely or not margined at tip;

Dull-black, hoary with fine white pubescence, especially on the prothorax which is densely punctured; elytra coarsely punctured;

Head dull ferruginous; front legs and base of middle thighs testaceous.

20. *RUFICEPS*.

Entirely black.

21. *SUBARGENTATA*.

Black, legs and scape of antennæ ferruginous; *rufibasis* Lec.; a, tarsi, tip of hind thighs and part of hind tibiae blackish. 21. *SIMILIS*.

\* *L. nana* and *erigua* Newm. are allied to *saucia*; the first is black with the base of the thighs yellow, the second has the scape of the antennæ and front legs yellow, and the prothorax golden-pubescent; I have seen only the types in the British Museum.

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Dark-blue, elytra with red humeral spot sometimes wanting; *militaris* Chev. 22. *MOLYBDEICA*.

d. Prothorax transversely depressed at the base, convex, much rounded on the sides before the middle, hind angles small (except in *impura*); elytra at base wider than prothorax, more or less narrowed behind, usually black, spotted or banded with yellow; genæ moderately long (shorter in \*\*\*);

\* Prothorax transversely excavated along the whole base, sides sinuate, tip strongly tubular; body beneath, margins of prothorax and elytral bands golden-pubescent; tip truncate, legs ferruginous;

Yellow bands broader at the suture;

Antennæ very stout, dark ferruginous.

23. *LETA*.

Antennæ more slender, nearly black; *quagga* Germ.

24. *NITENS*.

Bands equal straight, antennæ stout, blackish. 25. *TRIBALTEATA* n. sp.

\*\* Prothorax feebly excavated each side near the hind angles; pubescence not golden;

Brownish-yellow, densely clothed with fine pubescence, hind angles of prothorax more explanate and prolonged; elytra with a faint lateral fuscous spot at the middle.

26. *IMPURA*.

Prothorax narrowed from the base, sides subsinuate; elytra yellow, with two marginal spots and tip black, the later dehiscent, not truncate.

27. *CORDIFERA*.

Prothorax not narrowed from the base, sides sinuate, rounded in front, elytra with yellow bands or spots variously confluent, sometimes entirely black; suture dehiscent, tip rounded; *instabilis* Hald., *convexa* Lec.

28. *INSTABILIS*.

Prothorax not wider than long, more finely and densely punctured, body less robust, elytra less dehiscent at tip, which is more broadly rounded, and scarcely margined; yellow with base, two bands and apex black; bands sometimes interrupted; *veratrix* Mann.

29. *SEXMACULATA*.

Legs and antennæ ferruginous, elytra feebly dehiscent, tips more broadly rounded;

Very robust, black, elytral margin from base to middle, and two lateral spots yellow; tip scarcely margined.

30. *QUADRATA* n. sp.

Less robust, elytra yellow, entire margin black, a discoidal spot near the base, large lateral one near the middle, and transverse one near the tip black; tip distinctly margined.

31. *SEXSPILOTA*.

\*\*\* Prothorax broader than long, campanulate, transversely excavated or depressed along the whole base, sinuate on the sides, tip strongly constricted and tubular; pubescence not golden, elytra rounded and margined at tip; mouth and genæ rather stout;

Elytra testaceous with a large blotch behind the middle, extending to the margin but not the suture, and tip black.

32. *MATTHEWSII*.

Entirely black, more coarsely punctured.

33. *GROSSA* n. sp.

- e. Prothorax longer than wide, subcampanulate, with a deep transverse impression near the base, hind angles broad, laminate; color black, elytra sometimes testaceous, scarcely narrowed behind; antennæ with the 4th joint very short;

Prothorax coarsely, elytra very coarsely, punctured, truncate, and spinose; antennæ ♀ short, thickened externally. 34. *BREVICORNIS* n. sp.

Prothorax densely and coarsely punctured, antennæ slender, elytra sharply truncate at tip. 35. *NIGRELLA*.

Prothorax sparsely punctured, antennæ slender, elytra feebly truncate at tip. 36. *CARBONATA*.

B. Prothorax more or less triangular or campanulate, widest at base, hind angles not prolonged. (Antennæ with 4½ joints punctured, the remainder sericeous;) *LEPTURA* restrict. *Serville*.

- a. Antennæ annulated with yellow, 11th joint distinctly divided; elytra narrowed from the base, tip truncate and dentate; ♂ with antennæ serrate, and 5th ventral flattened triangularly, emarginate, and bidentate (sculpture usually coarse, prothorax deeply bisinuate at base with a deep transverse impression);

Elytra truncate-emarginate at tip; prothorax more deeply constricted behind; 11th joint of antennæ strongly appendiculate. ♂ antennæ strongly serrate, almost entirely black, *tenuicornis* Hald.; ♀ antennæ feebly serrate, annulate with yellow; a. Elytra coarsely punctured not shining; 1, base of elytra red, *canadensis* Fabr.; 2, elytra entirely red, *erythroptera* Kirby, *cinnamoptera* Hald.; B. Elytra almost cribrate, shining; 1, elytra entirely red, *cribripennis* Leo.; 2, elytra red at the base; 3, elytra entirely black. 37. *CANADENSIS*.

Black, prothorax and elytra bright red, more densely and finely punctured, antennæ not annulated. 38. *COCCINEA* n. sp.

Elytra truncate at tip, prothorax feebly constricted behind;

elytra entirely red, antennæ joints 1-5 black, 11th joint feebly appendiculate. ♂ antennæ feebly serrate, abdomen red; ♀ antennæ nearly filiform, abdomen black; *erythroptera* || Germ. 39. *RUBRICA*.

elytra pale, side margin and tip black. 40. *CIRCUMDATA*.

- b. Elytra narrowed from the base, very dehiscent at tip, which is rounded and indistinctly margined; prothorax feebly constricted at base, antennæ subserrate in ♂ with 11th joint feebly appendiculate;

Antennæ annulate with yellow, elytra very coarsely punctured, more or less testaceous, sometimes entirely black; ♂ with 5th ventral deeply excavated and emarginated. 41. *VAGANS*.

Antennæ entirely black, elytra less coarsely punctured (testaceous in the specimens examined); ♂ with 5th ventral less excavated and emarginated. 42. *DEHISCENS*.

- c. Antennæ not annulated, 11th joint scarcely appendiculate, elytra slightly narrowed from the base, truncate at tip; prothorax scarcely constricted behind;

- \* Prothorax densely and coarsely punctured; 5th ventral in ♂ flattened and truncate;  
 Elytra reddish, testaceous, fuscous towards the tip, which is transversely truncate. 43. *SANGUINEA*.\*
- Elytra obliquely truncate at tip; ♂ entirely black, *lugens* Lec; ♀ elytra scarlet, with a subsutural spot before the middle, one near the side at the middle and tip black, *latifica* Lec. 44. *LATIFICA*.
- Elytra testaceous, feebly truncate, apex and subapical band black; pubescence very long. 45. *HIRTILLA* n. sp.
- \*\* Prothorax less densely punctured; 5th ventral ♂ flattened and broadly rounded;  
 Elytra obliquely truncate and subdentate at tip; black with yellow markings, consisting of a subcutellar spot, and two transverse bands connected at the suture, more or less interrupted. 46. *QUADRILLUM*.
- \*\*\* Prothorax coarsely punctured, elytra densely pubescent with golden hair arranged transversely, 5th ventral ♂ scarcely impressed;  
 Elytra transversely truncate, frequently fuscous at the sides: *α*. pubescence of elytra longer and denser, *chrysocoma* Kirby; *β*. pubescence of elytra shorter, *auripilis* Lec. 47. *CHRYSOCOMA*.
- \*\*\*\* Prothorax usually densely and coarsely punctured, transversely impressed and constricted behind, disk more or less channelled; pubescence of elytra short and sparse; 5th ventral of ♂ scarcely impressed;  
 First joint of middle tarsi as long as the two following; prothorax feebly impressed;  
 Pubescence of prothorax golden, elytra testaceous, suture and lateral vitta extending to tip black. 48. *NIGROLINEATA*.
- Black, pubescence brown, elytra and legs testaceous, prothorax subangulated on the sides, elytra more coarsely punctured. 49. *RUFULA*.
- First joint of middle tarsi scarcely longer than 2d; (sides of elytra more sinuate);  
 Elytra testaceous, tip black. 50. *PROXIMA*.
- Entirely black, (more robust in form). 51. *ATREATA*.
- First joint of middle tarsi as long as the two following, prothorax sparsely punctured, more deeply channelled and impressed; (hind angles of head more tumid, and nearly square, elytra elevated at the base);  
 Fusco testaceous, elytra paler with a medial marginal dark spot, antennæ ♂ very long. 52. *BIPORIS*.
- Black, antennæ ♂ moderate. *DOLOROSA*.
- d. Antennæ not annulated, 11th joint scarcely appendiculate, elytra elevated at the base, elongate, scarcely truncate, feebly narrowed from the base in ♂, not densely but very finely pubescent, yellow with black spots or bands; prothorax bell-shaped,

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\* Allied to the European *cincta* Fabr.

transversely impressed at base, which is more deeply sinuate than usual;

- \* Hind angles of head nearly square, genæ rather long; ♂ with 5th ventral impressed, truncate, and emarginate;

Ferruginous, prothorax obtusely angulated on the sides, elytra with 3 bands and apex black, all connected at suture and margin, antennæ very stout.

53. *CRASSICORNIS* n. sp.

Legs entirely yellow, prothorax tolerably strongly sinuate on the sides; Abdomen usually yellow, sometimes banded with black, rarely almost entirely black, *fasciventris* Lec.

54. *CRASSIPES*.

Thighs and tips of tibiae dark, prothorax rather rounded than sinuate on the sides, abdomen black.

55. *TIBIALIS*.

- \*\* Hind angles short, tumid but obtuse, neck less constricted; prothorax less sinuate on the sides, more finely and less densely punctured, pubescence white, long, and fine;

Black, elytra with a basal spot, two bands connected near the suture, and a large spot near the tip, yellow; legs and abdomen ferruginous, tarsi dusky.

56. *BEHRENSII* n. sp.

- \*\*\* Hind angles of head very short, rounded; ♂ as above;

Blackish-blue, shining, prothorax feebly rounded on the sides, elytra slightly truncate at tip, with four pale yellow spots on each; base of thighs pale.

57. *OCTONOTATA*.

- e. Antennæ annulated, 11th joint not appendiculate, elytra not elevated at the base, elongate, parallel, truncate at tip; prothorax bell-shaped, constricted strongly at tip, and less strongly at base; hind angles of head obtuse, genæ moderate, front with a deep transverse impression;

Black, with fine sparse yellowish pubescence; head and prothorax finely, very densely punctured, elytra twice as wide as prothorax, punctured, more densely and a little more finely towards the tip; antennæ long and slender (♀), annulate with pale, legs ferruginous or fuscous.

58. *PEDALIS*.

C. Prothorax constricted before and behind (except in a); hind angles not prolonged; last joint of palpi dilated, triangular, truncate, sometimes obliquely, sometimes transversely; hind angles of head obtuse and rounded, never square; elytra scarcely narrowed behind;

- a. Elytra protuberant at base; tip subtruncate, suture with a small spine; prothorax scarcely constricted, more deeply bisinuate at base;

- \* Head prolonged behind the eyes;

Sparsely punctured, black, shining, elytra with a yellow vitta from base to behind the middle, usually sinuate, sometimes wanting.

59. *VITTATA*.

- \*\* Neck very near to the eyes;

Black, prothorax pubescent with erect hair, densely punctured, with a smooth dorsal vitta.

60. *PUBERA*.

- b. Elytra not protuberant at base, rounded at tip; prothorax very deeply constricted before and behind, sides strongly rounded, and disk very convex; head prolonged behind the eyes;  
 Black, front legs, base of thighs, and tibiae more or less yellow; prothorax sometimes red, very finely pubescent, nearly smooth; base punctured, *paupercula* Newm.; *ruficollis* Say; *allecta* Newm. 61. *SPHÆRICOLLIS*.  
 Black, front legs, base of thighs, and tibiae more or less yellow, prothorax sparsely finely punctured, base punctured; elytra more coarsely punctured, with a yellow vitta extending from the base almost to the tip, sometimes interrupted near the tip, *nitidicollis* Horn. 62. *VIBEX*.  
 Testaceous, prothorax densely punctured, clothed with yellow pubescence; elytra more coarsely punctured, with a sutural and lateral black vitta, extending nearly to the tip. 63. *AURATA*.  
 Piceous or black, prothorax scarcely punctured, feebly pubescent; elytra less coarsely punctured, with three marginal spots and a sinuate black vitta extending from base for three-fourths the length, where it is confluent with the posterior spot; legs testaceous, hind thighs dusky at tip;  
 a. Vitta reduced to a very short basal streak; and marginal spots to faint clouds. 64. *SCRIPTA*.  
 c. Elytra not protuberant at base, rounded at tip, prothorax slightly constricted at base and at tip, sides tuberculate, head prolonged behind the eyes; antennae stout, 3d and 4th joints united equal to 5th;  
 Testaceous, elytra very coarsely punctured, with a small fuscous spot near the side about the middle. 65. *GNATHOIDES* n. sp.  
 D. Prothorax constricted before and behind, hind angles scarcely prolonged, but broadly and feebly lobed; elytra parallel, truncate at tip, and armed with a strong sutural spine; palpi not dilated, penultimate joint of maxillary nearly as long as last joint; hind angles of head short, rounded, genae moderate, mouth rather short, front with a deep transverse impression; antennae slender with  $4\frac{1}{2}$  joints punctured, remainder sericeous; 11th joint not appendiculate; ♂ with antennae longer, and 5th ventral broadly and deeply emarginate with angles acute;  
 Testaceous, finely pubescent, elytra with narrow sutural line, two small clouds near the base, and two about the middle fuscous, (very large species). 66. *VALIDA*.  
 E. Prothorax quadrate, slightly narrowed in front, not constricted but only feebly impressed behind, elytra feebly narrowed from the base, slightly truncate at tip; palpi as in B, with the last joint feebly dilated, truncate, and longer than the preceding; head suddenly narrowed behind, but not constricted, very short hind angles, rounded; antennae with  $4\frac{1}{2}$  joints punctured, the remainder sericeous 11th joint of antennae of ♂ very strongly appendiculate, 7th and following with a smooth feebly carinated line beneath;  
 a. Elytra punctured;



Black, prothorax distinctly narrowed in front, pubescence short. a. Elytra dirty testaceous, *luridipennis* Hald.; 67. *MUTABILIS*.

Black, prothorax nearly square, pubescence long, erect, fuzzy.

68. *QUADRICOLLIS*.

b. Elytra rough with elevated points or granules;

Very black, thorax feebly bisinuate on the sides; antennæ not carinated, 11th joint not appendiculate. 69. *ASPERA*.

F. Prothorax constricted before and behind, wider at base, hind angles not prolonged; elytra wider, parallel, rounded at tip; head suddenly narrowed far behind the eyes, but not constricted, hind angles therefore long, broadly rounded; *eyes not emarginate*, antennæ inserted a little behind the front margin of the eyes, slender, with  $4\frac{1}{2}$  joints punctured, the remainder sericeous, 11th joint simple; genæ rather short, palpi with last joint triangular, truncate, as in *L. vittata*; this group differs from *Acmaeops* chiefly by the position of the antennæ;

Black, antennæ brown, front legs ferruginous, with knees, tip of tibiæ, and tarsi dark; head and prothorax longer than wide, densely and finely punctured, the latter subcanaliculate, with smooth narrow dorsal space.

70. *CUBITALIS*.

Prothorax not longer than wide, more densely punctured, elytra and legs testaceous.

71. *SPURIA*.

**541. *L. gigas*.** Niger pubescens, prothorace dense subtiliter punctato, dorso utrinque late deplanato, linea dorsali subelevata; elytris late fulvis, quadrisulcatis, apice nigris, emarginatis, bispinosis. Long. 35 mm.

The specimens commonly called *L. emarginata* from Texas differ from the northern individuals by the prothorax much more densely punctured, the disk more impressed each side, the dorsal line more elevated, the posterior impression less curved, the middle lobe of the base with a distinct transverse elevation near the margin, and finally by the elytra being each marked with four vague wide grooves, reaching neither the base nor the tip, and presenting somewhat the appearance observed in *Tragidion*.

**542. *L. soror*.** Testacea, flavo-pubescens, prothorace toto vel disco solo nigro, postice vage impresso; elytris fascia media alteraque ante apicem nigris, apice acuminatis, occipite pectorisque lateribus nigris; antennis validiusculis fuscis, vix annulatis. Long. 12 mm.

California; Dr. Horn. This is so closely allied to the lighter colored varieties of *L. oblitterata*, that it might be viewed as a less developed Southern race of that species. Nevertheless the elytra are less distinctly obliquely truncate at tip, so as to become rather rounded, and acutely acuminate; the antennæ are also stouter

in both sexes, and the 4th joint is more distinctly shorter than the 5th. The color varies quite as much as in *L. obliterata*, though I have never seen a specimen of *soror* with the antemedial spot, which is but rarely absent in the former. The prothorax is sometimes entirely black, sometimes with the disk and prosternum black, and all the margins yellow; the head is usually black, with the mouth, and antennal tubercles yellow; the trunk is sometimes entirely black, sometimes black only at the sides; the legs are testaceous, with the tarsi darker, and in one specimen the hind thighs are dusky at tip. The sexual characters are as in *L. obliterata*.

**543. *L. plagifera*.** Nigra, breviter pubescens, prothorace haud dense punctato, latitudine vix longiore, antrorsum valde angustato, lateribus ante medium subangulatis, angulis posticis productis, ante basin transversim impresso, et breviter subcanaliculato; elytris haud dense subtilius punctatis, postice dehiscentibus, oblique truncatis et acuminatis, sanguineis, vitta communi lata nigra pone basin ad apicem extensa; abdomine sanguineo, tibiis ferrugineis apice fuscis. Long. 13 mm.

One female. Lake Tahoe, Sierra Nevada; Mr. Edwards. Quite distinct by the characters above given; to be placed next to *L. abdominalis* Hald. The thoracic impression is angulated at the middle and extends to the sides; the pubescence of the prothorax is short and erect, that of the elytra is very short, and at first sight not conspicuous. The genæ are long, and the palpi slender as in the other species of the group.

**544. *L. rubida*.** Nigra, pube subtili fulva parce vestita, capite thoraceque confertim subtilius punctatis, illo angulis posticis brevibus rotundatis, genis medioocribus; hoc latitudine longiore, apice angustiore, lateribus late rotundatis, angulis posticis parvis acutis, basi utrinque late concavo; elytris fusco-testaceis, fortiter haud dense punctatis, fere parallelis, apice oblique subtruncatis vix marginatis; pedibus plus minusve ferrugineo-fuscis. Long. 13 mm.

One specimen; California. The pubescence is very fine, and is grayish beneath, though yellowish above. It is easily distinguished from the other species of the group by the larger size and different color. The general form is the same as in *L. subargentina*, etc.

**545. *L. tribalteata*.** Nigra, prothorace subtusque dense aureo-pubescent; prothorace campanulato, basi transversim excavato, angulis posticis acutis; elytris punctulatis, dense breviter pubescentibus, late flavis,

fasciis tribus transversis rectis apiceque nigris, apice oblique truncatis; pedibus rufo-testaceis, antennis validis nigris. Long. 10 mm.

One ♂ specimen; Owens' Valley, Dr. Horn. Allied to *L. læta* Lec., and having the antennæ equally thick, but differing from both it and *L. nitens* by the elytral fasciæ narrower and perfectly straight, so that the yellow predominates, while in the species just named the black is the ground color; the bead of the suture and a narrow basal margin are also black.

**546. *L. quadrata*.** Robusta nigra, breviter fulvo-pubescent, capite thoraceque confertim punctatis, illo angulis posticis brevibus rectis rotundatis, genis oreque sat prolongatis; hoc lateribus pone medium fere parallelis, antice obliquis, apice fortiter constricto, basi declivi, et utrinque vage concavo, angulis posticis parvis acutis; elytris subparallelis (♀), apice parum dehiscentibus rotundatis et marginatis, subtilius punctatis, macula laterali ad medium alteraque ad dodrantem parvis pallidis; antennis pedibusque ferrugineis. Long. 11 mm.

One specimen; Saskatchewan. I would be tempted to place this as one of the varieties of the Protean *L. instabilis*, but the elytra are less dehiscent and more broadly rounded at tip, the antennæ and legs are ferruginous, (always black in *instabilis*), and the pubescence is very short.

**547. *L. grossa*.** Crassa, nigra opaca, subtus brevissime cano-pubescent, (supra glabra?) capite thoraceque dense punctatis, illo angulis posticis tumidis rectis rotundatis, genis oreque medioocribus; prothorace latitudine breviori antrorsum multo angustiore et fortiter marginato, basi transversim depresso, lateribus subsinuatis, angulis posticis acutis, disco utrinque vage foveato, subcanaliculato; elytris sat dense punctatis, fere parallelis, apice rotundatis et marginatis. Long. 18 mm.

One ♀; California, Dr. Horn. Quite different from the neighboring species by the coarser punctuation; the sides of the thorax are subsinuate and less distinctly angulated than in *L. instabilis*, and the mouth and genæ are shorter. In this latter character it resembles *L. Matthewsii*; the form is, however, stouter, the antennæ thicker, and the punctuation much coarser.

Since publishing the description of *L. Matthewsii* I have received from the same collection a male. It differs by less robust form, and very long antennæ, one-fourth longer in fact than the body, and stouter than in the ♀. There is scarcely any ventral difference between the two sexes. The apical blotch of the ely-

tra is wanting, and the post-medial is reduced to a small cloud, almost as in *L. biforis*.

**548. *L. brevicornis*.** Nigra, sat robusta, opaca, capite dense, prothorace rude punctato, hoc campanulato, ad basin transversim profunde depresso, angulis posticis laminatis; elytris antice grosse, postice fortiter punctatis, apice oblique truncatis et breviter acuminatis; antennis (♀) brevibus, extrorsum crassioribus, articulis 8—10 crassities haud longioribus. Long. 19 mm.

Virginia City, Nevada; Mr. Edwards. Allied to *L. nigrella* Say, but stouter, much more coarsely punctured, and with quite different antennæ; the 3d joint is two and a half times as long as the 2d, the 4th is two-thirds the length of the 3d; the 5th is fully twice as long as the 3d, the 6th and 7th shorter and wider, 8th, 9th, and 10th, stouter and shorter, almost wider than long, subtriangular, somewhat rounded, 11th larger, oval, rather pointed. The total length barely extends beyond the base of the prothorax.

**549. *L. coccinea*.** Nigra, fulvo-pubescent, prothorace elytrisquæ læte rubris, illo dense punctato, latitudine baseos haud brevior, extrorsum magis angustato et constricto, postice constricto, angulis paulo laminatis, lateribus rotundatis; elytris confertim punctatis, postice paulo angustatis, apice oblique truncatis, spina exteriore longiore; tibiis tarsisque ferrugineis, antennis ♀ haud annulatis. Long. 17 mm.

California; Mr. Ulke. Of the same form as *L. canadensis*, but easily known by the finer punctuation, and differences in color.

**550. *L. hirtella*.** Nigra opaca, pubescens, capite postice, prothorace elytrorumque basi longius pilosis, fere lanuginosis, illis confertissime subtiliter punctatis; elytris a basi angustatis, apice subtruncatis, testaceis macula subapicali apiceque nigris; tibiis testaceis apice nigris. Long. 10 mm.

One ♂; Labrador; Dr. A. S. Packard. Easily distinguished by the very long hair of the head, prothorax, and front part of the elytra. The mouth is short, the genæ moderate, the hind angles of the head short, square, rounded; the prothorax a little longer than wide, campanulate, sides parallel behind, rounded in front, constricted at tip, convexly declivous at base, angles not prolonged. Antennæ long, subserrate (last joint?). Last ventral segment feebly channelled, truncate, and slightly emarginate, with the angles acute, and dentiform.

The 5th ventral in *L. sanguinea* ♂ is truncate, but not dentate, in *L. lætifera* and *quadrillum*, it is feebly impressed, but broadly rounded, as in the ♀.

**551. *L. crassicornis*.** Ferrugineus nitidus, elytris parce subtilius punctatis fasciis tribus apiceque nigris, omnibus ad suturam et marginem connexis; prothorace confertim, antice subtilius punctato, apice basique constricto, lateribus antice obliquis, dein obtuse angulatis et fere parallelis, basi fortiter bisinuato; elytris ad basin planiusculis fortiter lobatis, apice rotundatim subtruncatis; antennis validis (♀) corporis dimidio haud longioribus. Long. 15 mm.

California; Mr. Ulke. Allied to *L. crassipes* Lec., but much larger, differing in color, with the antennæ very much stouter and shorter.

**552. *L. Behrensi*.** Elongata nigra, subnitida, pube alba tenui longiuscula parce vestita; capite thoraceque subtiliter punctatis, hoc latitudine longiore, antorsum angustiore, lateribus subsinuatis et late rotundatis, apice basique transversim constrictis, basi profunde bisinuata, angulis posticis subaentis haud prolongatis; elytris parallelis, apice subtruncatis, antice planiusculis haud impressis, haud dense punctatis, macula subscutellari, plaga maxima maculam lateralem includente, maculaque prope apicem flavis, abdomine pedibusque ferrugineis, genubus tarsisque fuscis. Long. 17 mm.

One ♀; Mendocino, California, sent by Mr. Jas. Behrens to Dr. Horn. This species is apparently the western analogue of *L. 8-notata*, but is much larger, and the spots are differently formed and arranged. It gives me much pleasure to dedicate this species to the industrious and intelligent gentleman by whom it was collected, who by his labors has greatly added to our knowledge of the entomological fauna of the Pacific States.

The antennæ are slender, more than half the length of the body, the 4th joint about two-thirds the length of the 5th joint. The spots on the elytra are pale yellow; one near the base, extending obliquely inwards, an oblique fascia running from the margin a little in front of the middle, a second broader fascia behind the middle, connected with the first near the suture, so as to inclose a large subquadrate lateral spot; another large spot near the tip, attaining neither the suture nor margin.

Should the yellow spots be greatly extended, and the black reduced, varieties might occur somewhat resembling some varieties of *L. crassipes*, but would be at once distinguished by the diffe-

rent form of the prothorax, which is less convex, less rounded on the sides and less punctured, by the finer pubescence, and by the elytra being less protuberant at the base, with a less deep intrahumeral impression.

**553. *L. gnathoides*.** Testacea, parce subtiliter pubescens, thorace confertim punctato, latitudine sesqui longiore antice posticeque subconstricto, apice angustiore, lateribus sinuatis, antice medium obtuse tuberculatis; elytris parallelis, apice rotundatis, gutta parva sublaterali picea versus medium ornatis, grosse punctatis, punctis postice sensim minoribus; antennis (♂) validis, articulo 4to 3io brevior, 5to illis conjunctis æquali. Long. 9 mm.

One male; Oregon, Mr. Edwards. The head is square behind with rounded angles, the genæ moderately short, and the palpi dilated as in *L. scripta*, and the others of that group (C-b); but it is remarkably different by the antennæ which are stout, with the 3d and 4th joints much shorter, and united only equal to the 5th. The sculpture of the elytra is very coarse, and the general appearance recalls *Gnathium* of the Meloidæ.

**554. *L. aspera*.** Nigra, opaca, capite thoraceque dense punctatis, hoc latitudine longiore, antrorsum sensim angustato, lateribus bisinuato, et vage transversim impresso, dorso late vage canaliculato, et utrinque late foveato; elytris basi thorace plus sesqui latioribus, postice parum angustatis, apice subtruncatis, dorso planis, granulis parvis minus dense asperatis. Long. 9—13 mm.

Vancouver Island; Messrs. Matthews. Entirely similar in form and appearance to *L. mutabilis*, but the thoracic impressions, though broad and shallow, are well defined; the proportion of the antennal joints is about the same, the 3d and 4th united being a little longer than the 5th; the outer joints are, however, not carinated beneath, and the 11th joint is not appendiculate. The antennæ are longer than the body in the ♂, and shorter in the ♀. The body beneath is pruinose, with very short whitish pubescence.

**555. *L. spuria*.** Nigra, cinereo-pubescens, capite thoraceque confertim subtiliter punctatis, hoc antice posticeque constricto, convexo, subcanaliculato, lateribus postice parallelis, antice obliquis, angulis posticis subprominulis; elytris parallelis, apice rotundatis, sat fortiter punctatis. Long. 11 mm.

Oregon and Washington Territory; one pair. The antennæ in the male are slender, nearly four-fifths the length of the body; scarcely more than half the length of the body in the ♀.

This and *L. cubitalis* form a peculiar group in the genus, having the eyes scarcely emarginate on the inner margin, and the 3d joint of the tarsi broader and more deeply bilobed than usual, agreeing in these characters with *Acmæops*; the head is much less constricted behind than in other *Lepturæ*, although it is suddenly narrowed, and the angles are rectangular and rounded, almost as in *Encyclops*; the front is, however, not vertical, the transverse impression is deep, the genæ rather short, the epistoma and mouth moderately long; the last joint of the palpi is but feebly dilated, and squarely truncate, longer than the preceding, as usual.

I would associate these species with the 2d division of *Acmæops*, but the antennæ seem to be inserted rather behind the line joining the front of the eyes, as in other *Lepturæ*, and the general appearance is more suggestive of the latter genus. They would, however, be equally well placed in either.

#### **MONILEMA SAY.**

A. Scape of antennæ feebly punctured, or nearly smooth;

a. Scape of antennæ acute inwards at tip;

Disk of elytra flattened, sides suddenly inflexed; prothorax cylindrical.

1. *APPRESSUM* Lec.

Elytra very convex; prothorax with a feeble lateral tubercle or spine, sides subsinuate.

2. *ANNULATUM* Say.

b. Scape of antennæ cylindrical at tip;

a. Body variegated with a network of white pubescence; sides of elytra suddenly inflexed;

Lateral tubercle of prothorax well-developed. 3. *ALBOPICTUM* White.

β. Sides of elytra suddenly inflexed; color uniform black, antennæ alone partly cinereous;

\* 3d joint of antennæ annulated;

Lateral spine of prothorax long, acute; disk of elytra flattened; (punctures variable, sometimes very few).

4. *GIGAS* n. sp.

\*\* 3-7 joints of antennæ annulated;

Prothorax sparsely punctured, lateral spine large, acute, disk of elytra not flattened;

5. *FORTE* n. sp.

Prothorax sparsely punctured at base and apex, lateral spine small, directed upwards, elytra not flattened.

6. *SEMIPUNCTATUM* Lec.

Prothorax with a few punctures near the base, lateral spine small, directed upwards; disk of elytra not flattened, (punctures variable, sometimes very few).

7. *ARMATUM* Lec.

Prothorax nearly smooth, lateral tubercle very feeble and obtuse; elytra with a few large punctures towards the sides. 8. *LEVIGATUM* Bland.

γ. Elytra wider, sides more convex, lateral tubercle of prothorax small, subacute, horizontal;

Body stouter, uniform black, elytra very convex. 9. *CRASSUM* Lec.

δ. Prothorax strongly, not densely punctured, sides scarcely tuberculate, elytra roughly punctured before the middle, sides suddenly inflexed. 10. *OBTUSUM* n. sp.

B. Scape of antennæ strongly punctured, cylindrical at tip;

Body more elongate (as in *M. armatum*); prothorax nearly cylindrical without lateral spine. 11. *SUBRUGOSUM* Bland.

**556 *M. gigas*.** Nigrum nitidum, prothorace punctis perpaucis notato, lineaque basali majorum, spina laterali elongata acuta; elytris antice grosse punctatis, dorso deplanatis, lateribus subito deflexis; antennis scapo haud mucronato, articulo 3io usque ad medium cinereo-pubescente. Long. 37 mm.

Arizona; Dr. Horn and Mr. Ulke. Easily known by the very large size, the extremely long thoracic spines, and only the 4th joint of the antennæ with a broad, cinereous band. The elytral punctures in one specimen are numerous, in the other very few.

**557. *M. forte*.** Nigrum subnitidum, prothorace parce fortiter punctato, punctis postice sat densis, spina laterali acuta; elytris subrugosis, basi præcipue versus latera grosse punctatis et asperatis, dorso convexiusculo, lateribus subito deflexis; antennis scapo haud mucronato, articulis 3—7 basi cinereis, 8—11 totis cinereis. Long. 32 mm.

Arizona; Mr. Ulke, also a very large species, but easily distinguished from the preceding by the prothorax being more punctured, the spines shorter, the antennæ annulate, and the elytra less flattened on the back. It may perhaps be an extremely well developed form of *M. semipunctatum* Lec., but in the absence of a full series of specimens it would be hazardous to unite them.

**558. *M. obtusum*.** Nigrum subnitidum, prothorace parce fortiter punctato, lateribus subsinuatis haud spinoso; elytris ante medium asperato-punctatis, dorso modice convexis, lateribus subito inflexis; antennis scapo haud mucronato, articulis 3—7 basi cinereo-pubescentibus. Long. 20 mm.

Utah; Mr. Ulke. Of the same form as *M. appressum* Lec. but with the elytra less flattened on the back, and the scape of the antennæ not mucronate; the cinereous bands of the antennæ are gradually shorter, so that the one on the 7th joint is very small.



**MONOHAMMUS SERV.**

The species infest pine trees throughout the whole extent of the United States, and contiguous northern regions. They may, following the arrangement proposed by Lacordaire, be tabulated thus:—

A. Elytra rounded at tip, suture prolonged;

Brown, elytra mottled with quadrate patches of brown and gray pubescence; sutural spine acute; prothorax rather smooth, sparsely punctured, lateral spine larger but less acute than in the next species.

1. *TITILLATOR* (*Oliv.*).

Smaller, brown, elytra more cylindrical, with some patches of fulvous hair in front of the middle, sutural spine larger and obtuse; prothorax more punctured and rugose, lateral spine more acute. Length 14—18 mm. Georgia.\*

2. *MINOR* n. sp.

Dark blackish-brown, with metallic gloss, elytra with gray pubescence, varied with quadrate patches of dark-brown hair, sutural spine obtuse; prothorax strongly punctured and rugose, spines acute densely clothed with whitish pubescence.

3. *MACULOSUS* *Hald.*

Blackish, with a dull leaden gloss, elytra as in the preceding, but the punctures are stronger, and tend to coalesce into transverse rugæ; prothorax less punctured but more rugose, lateral spines less densely clothed with yellowish-white pubescence.

4. *CLAMATOR* *Lec.*

B. Elytra rounded at tip, suture not prolonged;

Black with bronzed lustre; scutellum densely clothed with white hair, elytra with a few small spots of white pubescence.

5. *SCUTELLATUS* (*Say*).

Black with more leaden lustre; scutellum clothed with white hair, but with a denuded medial stripe; elytra with more abundant small patches of white pubescence, punctures more disposed to form transverse rugæ. Length 17—24 mm. Oregon and Washington Territory.

6. *OREGONENSIS* n. sp.

Gray, clothed with fine rather close gray pubescence, prothorax much less punctured and rugose, elytra with small patches of blackish-brown hair.

7. *CONFUSOR* *Kirby.*

C. Elytra gradually obliquely narrowed at the tip, suture not spinose;

Brown, elytra beautifully ornamented with large quadrate spots of fulvous cream-colored pubescence, and denuded spots: *M. fautor* *Lec.*; *acutus* *Lac.*

8. *MARMORATUS* (*Rand*).

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\* I have one specimen labelled Canada, but the locality seems doubtful.

**LOPHOPÆUM BATES.**

**559. *L. volitans*.** Fuscum dense pubescens, pilis volatilibus elongatis villosum, prothorace spina laterali acuta; elytris lateribus subito deflexis, bicarinatis, carina exteriori ad medium postice abbreviata, fusco maculatis, macula elongata selliformi scutelloque pallidioribus. Long. 5—8 mm.

Cape San Lucas; Mr. Xantus. This species seems to agree more nearly with the genus to which I have referred it than with any other of which I can find description. I should refer it to *Pogonocherus*, since the front coxal cavities are angulated externally nearly as much as in that genus, but the scape of the antennæ is much longer and more slender, as in *Leptostylus*, and extends to the lateral spine of the prothorax. The antennæ are about one-fourth longer than the body, and clothed on all sides with long hairs, the 3d and 4th joints are nearly equal, the 5th and following diminish rapidly in length. The prosternum is rather narrow between the coxæ, the mesosternum not wide, truncate and subemarginate behind, the middle coxal cavities angulated externally, though not open.

The body is clothed with dense pale brown pubescence, the antennæ are annulated and punctured with darker, the disk of the prothorax is mottled with darker, and the lateral spines are acute; the base, sides, and tip of elytra are dark, with still darker spots, leaving an elongate common spot of pale gray, emarginate in front and at the sides, extending from the humeri for two-thirds the length, limited for one-half its length by a well-defined carina, extending from the humerus, and becoming obsolete near the tip, which is rounded; outside of this carina is a shorter one, also proceeding from the humerus, and abbreviated at the middle. The body beneath is clothed with pale-brown pubescence, and the groove and tubercle of the middle tibiæ are feeble. The flying hairs are very long and numerous.

**LEPTOSTYLUS Lac.**

The species may be arranged as follows:—

- A. Elytra more broadly and regularly rounded at tip; lateral tubercles of prothorax not prominent, broadly rounded. PALMERI n. sp.
- B. Elytra more obliquely narrowed behind, obliquely subtruncate, or separately rounded;  
Elytra very rough with asperities. ACULIFER Say.

Asperities feeble, arranged in rows ;

\* Elytra flattened on the disk in front ;

Elytra with a white fascia behind the middle, lateral tubercle of prothorax very broadly rounded. *PLANIDORSUS* n. sp.

\*\* Elytra not flattened on the disk ; pubescence concealing the punctures ;

Elytra less prolonged behind, lateral tubercle of prothorax broadly rounded. *BIUSTUS* Lec.

Elytra more prolonged behind, lateral tubercle of prothorax obtuse but not rounded. *ALBIDUS* Lec.

Elytra less prolonged, lateral tubercle obtuse not rounded, (much smaller). *PARVUS* n. sp.

\*\*\* Elytra not flattened on the disk ; pubescence not concealing the punctures ;

Elytra obliquely rounded, truncate at tip ; not fasciate with white ;

Punctures of elytra rather fine, lateral tubercle of prothorax rounded.

*COLLARIS* Hald.

Punctures of elytra very coarse ;

Larger, lateral tubercle of prothorax obtuse, rounded. *PERPLEXUS* Hald.

Smaller, tubercle of prothorax obtuse, not rounded. *COMMITUS* Hald.

Elytra more broadly rounded, truncate at tip, prothorax with very obtuse rounded lateral tubercle and black spots, and elytra with a paler band behind the middle. *MACULA* Say.

**560. L. Palmeri.** Nigro-piceus, prothorace transverso, pube ochrea variegato, parce grosse punctato, lateribus paulo dilatatis, haud tuberculatis, prope basin transversim constricto et angustato ; elytris prothorace plus sesqui latioribus, dorso antice planiusculis, parce grosse punctatis, apice rotundatis, pube brevi ochrea dense vestitis, fascia basali, macula laterali, fascia postica, guttisque pluribus obscuris ; antennis cinereo-annulatis. Long. 18—25 mm.

A female from Arizona, collected by Dr. Henry Palmer, kindly given me by Mr. Ulke, in whose collection it bears the name I have adopted ; a male sent by Mr. C. V. Riley to Dr. Horn. Conspicuous by its large size ; besides the dark spots on the elytra mentioned in the diagnosis, there is also one near the side, about one-fourth from the apex, which is also dark ; the band is sinuated, and runs slightly obliquely backwards from the suture. The male is very remarkable for having the 6th joint of the antennæ dilated inwards at the tip.

**561. L. planidorsus.** Subtiliter dense griseo-pubescent, prothorace dorso subtuberculato, tuberculo laterali obtuso haud rotundato, apice et basi parce punctato ; elytris dorso antice deplanatis, carina laterali dis-

tincta, alteraque obliqua usque ad medium extensa, fasciulis solitis parvis nigris, plaga magna laterali ante medium, fasciæque obliqua pone medium nigricantibus; fasciæ pallide pubescente paulo pone medium ornatis; antennis cinereis, fusco punctatis et annulatis. Long. 9 mm.

Louisiana; this species is sufficiently distinct by the disk of the elytra being flattened in front, limited each side by an oblique well-defined line, exterior to which is the line defining the abrupt declivity of the sides; towards the tip they are regularly rounded, scarcely prolonged, and obliquely truncate at the extreme tip. The small tufts of black hair are well developed; there is a large lateral dark blotch extending from the side to the oblique ridge, behind which is a broad band of paler cinereous, somewhat as in well marked specimens of *L. macula*; behind this pale fascia the pubescence is dark, with an oblique band composed of two blackish spots, and then a subapical dark cloud. Beneath covered with cinereous pubescence, medial band and apex of tibiæ, and tarsi blackish.

**562. *L. parvus*.** Testaceus, pube subtili dense vestitus, prothorace dorso obsolete tuberculato, lateribus obtuse angulatis; elytris apice singulatim rotundatis, parce fortiter punctatis, tuberculis parvis penicellatis parvis ornatis; capite thoraceque obscurioribus, antennis tibiisque piceo-annulatis. Long. 4 mm.

Two specimens; Western States. A robust little species, very easily recognized; the disk of the elytra is obliquely impressed in front of the middle, and the post-humeral compression is quite distinct.

#### **STERNIDIUS Lec.**

This new genus is founded upon the species of Div. C of my arrangement of *Liopus*, (Journ. Acad. Nat. Sci. Phila., 2d ser. ii, 172). They differ from *Leptostylus* by the 1st joint of the hind tarsi as long as the two following, and from *Liopus* by the mesosternum being broad and truncate between the coxæ. The thoracic tubercle varies in position but little, and is about one-fourth to one-third from the base, obtuse, but not rounded; the sides are emarginate behind the tubercle, but straight and oblique in front of it; there are no dorsal tubercles.

A. Elytra without an ascending angular blotch behind the middle; larger species;

Elytra mottled, with lines of tessellated black and white; a white spot near the apex, with a quadrate black spot in front of it.

1. *VARIEGATUS* Hald.

B. Elytra with a common fuscous cloud angulated at the suture;

Elytra scarcely mottled, apex slightly obliquely narrowed and feebly prolonged, angle of fuscous spot acute.

2. *ALPHA* Say.

Elytra more distinctly mottled, apex more obliquely prolonged, angle of fuscous spot acute.

3. *CINEREUS* Lec.

Elytra more distinctly mottled, apex less prolonged, angle of fuscous blotch obtuse, margined before and behind with whitish pubescence.

4. *XANTHOXYLI* Shimer.

C. Elytra without angular blotch behind the middle, smaller species;

Elytra mottled with small black points, an indistinct transverse white band behind the middle.

5. *PUNCTATUS* Hald.

Broader, elytra sparsely mottled with black points, without white band, lateral tubercle more acute.

6. *CRASSULUS* n. sp.

D. Thoracic spine nearer the base, elytra and prothorax with lines of fulvous and fuscous pubescence.

7. *HALDEMANI* Lec.

*L. misellus* and *rusticus* Lec., l. c. seem to be individual variations of *S. alpha*.

**563. *S. crassulus*.** Fusco-piceus, pube brevi cinerea dense vestitus prothorace longitudine plus duplo latiore, guttis 3 fuscis signato, spinis lateralibus acutis; elytris punctis parvis nigris triseriatim digestis, nebula laterali, lineaque transversa mox pone medium fuscis, apice rotundatis, haud prolongatis, vix truncatis. Long. 6 mm.

One specimen; Cape San Lucas, Lower California; Mr. Xantus. The antennæ are annulated, a little longer than the body. This species is more robust than the others, resembling a *Lep-tostylus*, from which it is immediately distinguished by the acute thoracic spines, and the 1st joint of hind tarsi equal to two following united.

#### **EUTESSUS** Lec.

This new genus is established upon a singular species from Lower California, of which only males are known to me. It is elongate in form, resembling in proportion the common *Graphisurus fasciatus*, but the prothoracic lateral spines are very near (about one-fifth of the length from) the base, as in *Liopus*; in front of the angle of the spines, the sides are straight and converge slightly; the base and apex are rectilinear. The elytra are elongate parallel, somewhat compressed at the sides, obliquely truncate inwards at the tip; they have several rows of distant small

asperities (very much as in *Leptostylus aculifer*), and behind the middle several of these combine to form an elevation, which runs transversely from the side, and then bends abruptly backwards, and is curved to the suture. But the most striking characters are found in the antennæ; which are 4 or 5 times as long as the body, very slender, fringed with short fine hair beneath, as in the ♂ of the other genera of the group; with the scape extending to the base of the prothorax, the inner edge acute towards the base, 2d joint very short, 3d reaching to the extremity of the elytra, 4th joint excessively long, nearly or quite three times as long as the 3d, with an apical tuft of stiff bent black hairs on the inner side; the seven following joints united not longer than the 4th joint.

The legs are moderate, thighs very feebly clubbed, middle tibiæ with an oblique groove on the outer side, hind tarsi much shorter than the tibiæ, with the 1st joint as long as the others united.

**564. *Eu. asper.*** Niger, dense breviter cinereo-pubescent, haud pilosus, thorace subinæquali, parce punctato, variegato; elytris parce punctatis, granulis nigris, parois asperatis, vittaque nigra sublaterali a basi ultra medium extensa ornatis. Long. 14 mm.

Cape San Lucas; Mr. Xantus. I have no doubt from the characters above detailed that the ♀ has a long ovipositor.

#### **EUPOGONIUS Lec.**

**565. *Eu. pubescens.*** Plumbeo-niger, aequaliter tenue cinereo-pubescent, et longe villosus, prothorace confertim punctato, latitudine longiore, spina laterali minuta; elytris latioribus fortiter punctatis, elongatis cylindricis. Long. 6.5 mm.

Ohio; Mr. Ulke. More slender than *Eu. vestitus* (Say) with the pubescence much finer, and altogether uniform and unmottled. *Eu. pauper* Lec. seem to be scarcely different from *vestitus* (Say).

To this genus belongs *Amphionycha subarmata* Lec. (Col. Kansas, 22), which as observed (Pr. Ac. Nat. Sci., Phil. 1861, 354), bears a deceptive resemblance to *A. flammata* Newm., but has the eyes coarsely granulated, and the claws simple and divaricate.

**POGONOCHERUS** SERV.

The following characters will serve to distinguish our species:

- A. Erect hairs, very long; elytra truncate and bispinose;  
 Crests of elytra strongly marked;  
     Scarcely variegated, crests feebly tufted. 1. *CRINITUS* n. sp.  
     With a white fascia before the middle of elytra, crests with long tufts  
     of hair. 2. *PENICELLATUS* Lec.  
     Crests of elytra feeble, with a large anterior transverse white band,  
     badly defined in front. 3. *OREGONUS* Lec.
- B. Erect hairs short; elytra with an anterior white blotch;  
     Elytra rounded at tip. 4. *SIMPLEX* n. sp.  
     Elytra truncate at tip, and subbispinose;  
     Moderate sized, more strongly punctured. 5. *MIXTUS* Hald.  
     Very small, less strongly punctured. 6. *PARVULUS* Lec.
- C. No erect hairs; pubescence uniform;  
     Elytra rounded at tip. 7. *SORDIDUS* n. sp.

**566. *P. crinitus*.** Dense cinereo-pubescent, subvariegatus, pilis pallidis longissimis villosus; prothorace lateribus fortiter armato; elytris oristis solitis valde elevatis, vix penicellatis, apice bispinosis, spina exteriori longiore. Long. 9 mm.

California; Mr. Ulke. Easily recognized by the absence of conspicuous white spots, the stronger armature of the prothorax and elytra, and the longer erect hairs.

**567. *P. simplex*.** Nigro-piceus, pube albida variegatus, parce nigropilosus; elytris versus suturam confuse, extrorsum seriatim punctatis, plaga majore obliqua alba ante medium signatis, apice rotundatis, haud truncatis, sutura prominula. Long. 6 mm.

Kansas and California; Resembles closely *P. mixtus*, but the usual ridges of the elytra are scarcely to be traced, and the tip is not truncate.

**568. *P? sordidus*.** Piceus pube minus subtili sordida dense vestitus, prothorace haud dense profunde punctato, latitudine vix brevior, spina laterali longa acuta; elytris parallelis apice rotundatis, punctis profundis subseriatim digestis; antennis sub-annulatis, parce ciliatis. Long. 8—13 mm.

Cape San Lucas; Mr. Xantus. This species is quite unlike the others, on account of the absence of long erect hairs; in color and sculpture it bears a singular resemblance to *Ataxia*, but is of a different form, and the generic and tribal characters are very different. I can find nothing of importance to separate it from *Pogonocherus*.

The pubescence is uniform dirty yellowish-brown, and rather coarse, intermixed with short suberect gray hairs proceeding from the punctures. The usual ridges of the elytra are entirely wanting. The front coxal cavities are angulated as in the other species. The body beneath is finely punctulate and pubescent, sparsely punctured with fuscous.

The antennæ are one-half longer in ♂, and but little longer than the body in ♀. The largest specimens are all males.

#### SAPERDA FABR.

The species in our fauna may be conveniently arranged as follows:—

I. Outer claw of front and middle tarsi ♂ with a large basal tooth or obtuse process;

A. Elytra separately acuminate at tip;

Process of ♂ unguis long; color yellow-brown, with four oblique darker bands.

1. *OBLIQUA* Say.

B. Elytra rounded at tip, with an acute sutural spine;

Cinereous, head and prothorax vittate, elytra spotted with ochreous-yellow pubescence; process of ♂ unguis long; a. Ground color brownish-yellow, spots not conspicuous, *adsperna* Lec.

2. *CALCARATA*.

C. Elytra slightly deliscent, and separately rounded at tip;

More coarsely punctured, pubescence thin, varied with fulvous spots; process of ♂ unguis moderate.

3. *MUTICA* Say.

Pubescence fine and dense, concealing the punctures, brown, with white stripes or spots;

Under surface white, upper surface with two broad white stripes; process of ♂ unguis long, *bivittata* Say; a. With a brown spot upon the white vitta near the base of the elytra.

4. *CANDIDA* Fabr.

Prothorax with two white stripes, elytra each with two large white spots attaining neither margin nor suture, sides of under surface white; process of ♂ unguis very long.

5. *CRETATA* Newm.

Prothorax with two white stripes, elytra with a humeral, two sub-sutural white spots; sides of under surface white; process of ♂ unguis small.

6. *FAYI* Bland.

D. Elytra more broadly and conjointly rounded at tip;

More densely clothed with uniform yellow-brown pubescence; elytra each with three small denuded spots; process of ♂ unguis moderate.

7. *VESTITA* Say.

Less densely pubescent; ♀ with prothorax, transverse sinuated fascia, and sides of elytra brownish, legs dark; ♂ with thin cinereous pubescence, legs ferruginous; process of unguis, of front feet small, of middle feet large, *fuscipes* Say.

8. *DISCOIDEA* Fabr.



Lateral stripe of prothorax and elytra and three oblique bands of scarlet pubescence; process of  $\zeta$  unguis of front feet small, of middle feet larger;  $\alpha$ . Varies ( $\zeta$ ) with the bands narrower, more oblique and sometimes obsolete.

9. *TRIDENTATA* Fabr.

Lateral stripe of prothorax and elytra, and sutural line of scarlet pubescence; process of  $\zeta$  unguis broad and short.

10. *LATERALIS* Fabr.

II. Claws simple in both sexes;

Lateral and sutural margin of elytra, prothorax, and head clothed with bright yellow pubescence, head with two, prothorax with six black spots; *trigeminata* Randall.

11. *PUNCTICOLLIS* Say.

Black, coarsely punctured, thinly clothed with fine cinereous pubescence;  $\alpha$ . Pubescence fulvous, punctures rather coarser; (Cal. Oregon.)

12. *MORSTA* Lec.

Black, densely clothed with cinereous pubescence, less coarsely punctured.

13. *CONCOLOR* Lec.

#### **MECAS** Lec.

**569. *M. marginella*.** Atra subtiliter pubescens, et breviter villosa, prothoracis lateribus et vitta dorsali, elytrorum margine laterali apicali et suturali pube pallide flava dense vestitis. Long. 7—8 mm.

Western States and Texas. Easily distinguished by the above characters; the thoracic vittæ do not extend upon the head; the elytra are coarsely punctured, and rounded at tip; the inner division of the claws is acute, and a little shorter than the outer one, though more nearly equal than in *M. femoralis*.

#### **STYLOXUS** Lec.

Eyes coarsely granulated, very large, scarcely separated on the vertex, deeply emarginate, but not divided, upper lobe moderately wide; front deeply channelled, antennæ about twice as long as the body, slender, 11-jointed, scape shorter than the head, suddenly constricted at base, with the basal angle rectangular prominent, and the apical edge armed at the inner side with a short spine, there is also on the lower side a large well defined apical cicatrix; 2d joint distinct, but with condyle projecting, larger than the joint itself; following joints nearly equal, sparsely ciliate beneath, 11th shorter. Palpi very unequal, maxillary with the last joint oval pointed, labial very small; mandibles short, stout, pointed. Prothorax cylindrical, one-half longer than wide, slightly and obtusely dilated at the middle. Elytra three-fourths



## FAM. LXIII.—SPONDYLIDÆ.

I would unite under this name all the aberrant Cerambycidæ of Lacordaire, whether classed with the Prionidæ or Cerambycidæ. By Mr. Thomson they have been in part separated as distinct families, under the general name Subcerambycidæ: he has, however, excluded Spondylis from them and retained it with Scaphinus among the Cerambycidæ.

It seems a more natural view to regard them as sub-families (or tribes, as the case may be), having the same relation to each other as the sub-families and tribes of the Cerambycidæ, and representing in the modern fauna the last remnants of the prophetic, synthetic, or undifferentiated\* types of a former geological age. They are, therefore, few in number, without very obvious relations with each other, or with the numerous forms of Cerambycidæ, with which they cannot be intercalated, without interrupting the obvious series of relationships.

They may be briefly described as extraordinary forms, differing not only in appearance from other Longicorns, but also by the tarsi being all deprived of the brush of hair beneath; the 3d joint not bilobed, entire or feebly emarginate, the 4th joint frequently well-developed; the antennæ are short, with the scape very short, much constricted at base, inserted at the side of the head near the base of the mandibles, under a more or less developed ridge; 2d joint rather large, though smaller than the 3d. In our two sub-families the poriferous system of the antennæ is contained in deep foveæ, differing in shape according to the genus. The other characters vary, as may be seen by the table in Thomson, Syst. Cerambyc., 312.

Two sub-families exist in our fauna:—

Prothorax margined; labrum connate.  
Prothorax not margined; labrum free.

PARANDRIDÆ.  
SPONDYLIDÆ.

\* These three appellations will be acceptable according to the metaphysical school to which the reader may belong. I write not to sustain a theory, but merely to present facts in such relation with other facts, as enables them to be most conveniently classified. The result is the same whatever hypothesis be adopted.

## Sub-Family I.—PARANDRIDÆ.

The body is elongate, parallel, smooth and shining; head broad, eyes transverse, convex, rather coarsely granulated, feebly emarginate; antennæ extending to the base of the prothorax, in front of the eyes, near the base of the mandibles, under distinct lateral ridges, polished, scape short and thick, strongly constricted at base; 2d joint half as long as 3d; 3-10 equal, subquadrate, constricted at base, flattened, with two deep grooves on the under surface, separated by a convex space, but limited on their outer edge by an acute ridge; 11th joint longer, obliquely truncate and pointed, with the same two grooves, and an apical fovea. Mandibles dentate, longer in ♂ than ♀; labrum pointed, connate with the front; mentum very transverse, closing the buccal fissure, bisinuate in front, ligula corneous very transverse, broadly truncato-sinuate in front; palpi short, labials inserted at the sides of the ligula, widely distant; maxillaries not longer, last joint cylindrical; maxillæ with one very slender and small lobe, sparsely ciliate at tip. Prothorax quadrate, margined at the sides; mesonotum punctured, without stridulating plate, not distinctly separated from the scutellum, which is triangular rounded at tip. Elytra parallel, margined, rounded at tip; epipleuræ extending to the sutural tip; wings perfect. Prosternum distinct between the coxæ, which are large, not prominent, transverse, and inclosed behind; middle coxæ oval, cavities widely open externally, mesosternum parallel, truncate or submarginate at tip; hind coxæ not prominent, transverse, extending to the sides of the abdomen; episterna of metathorax parallel, narrow; ventral segments 5, equal, alike in both sexes, intercoxal process acute. Legs rather short, thighs compressed; tibiæ compressed, outer angle acute, spurs rather strong, tarsi slender, without brush beneath; 4th joint half as large as the 3d, 5th as long as the others united, claws strong, paronychium slender, small, with two terminal setæ.

The species of *Parandra* live under pine bark, and are not very well defined.

The affinities of this genus with *Prionidæ* are quite apparent, but those with *Lucanidæ* are equally obvious, with also some tendency towards *Cucujidæ* in *Passandra*, *Catogenus*, &c.

## Sub-Family II.—SPONDYLIDÆ.

Body elongate, rather convex and robust, punctured, opaque or nearly so; head large, eyes transverse, not convex, rather finely granulate, feebly emarginate. Antennæ short or extending beyond the base of the prothorax, inserted under slight prominences in front of the eyes, near the base of the mandibles; 1st joint oval, stout, a little longer than the 3d; 2d about half as long as 3d, or (Scaphinus) nearly as long; remaining joints equal, transverse (Scaphinus), or oval (Spondylis), each with two foveæ on the under surface, which in the former are very large and deep, in the latter small and near the apex; 11th joint pointed at tip. Labrum small, separate. Mandibles long, slender, not toothed; palpi long, not dilated, last joint oval, truncate; mentum very transverse, buccal fissures wide, filled by the base of the maxillæ; ligula very large, corneous, concave, emarginate in front, with broadly-rounded lobes; labial palpi distant, situated on the inferior surface, but remote from the sides. Maxillæ with very small slender lobes. Prothorax oval, convex, narrowed behind, not margined; mesonotum polished, sparsely punctured, without stridulating plate, broadly channelled, distinctly separated from the scutellum by a transverse excavation. Elytra parallel, rounded at tip, epipleuræ narrow, not extending to the suture; wings perfect.

Prosternum distinct between the coxæ, which are subconical, somewhat prominent, angulated externally, and inclosed behind; middle coxæ oval, cavities widely open externally, with distinct trochantin, mesosternum triangular, slightly truncate at tip; episterna of metathorax rather wide, narrowed behind, hind coxæ large, extending to the side of the abdomen, prominent in Scaphinus, but not in Spondylis. Ventral segments 5, equal, similar in both sexes, intercoxal process acute.

Legs rather short, much stouter in Scaphinus than in Spondylis; thighs thick compressed; tibiæ compressed, finely serrate, outer angle prolonged into a flange much more developed in Scaphinus; spurs well developed, unequal on the front pair, obtuse and broad on the hind feet. Tarsi short without brush of hairs beneath, though hairy in Spondylis; 3d joint emarginate; 4th small, but distinct; 5th long, with slender rather large claws, and a very small bisetose onychium.

*Spondylis upiformis* extends from Alaska to Lake Superior. *Scaphinus sphaericollis* is found in pine woods of the Southern States.

A near approach is said to be made by *Spondylis* to *Aseum*; but while recognizing the resemblance, it appears to me to be a very remote one, and I rather consider the present form to be that which makes the closest approach to the next family, without, however, actually belonging to it.

#### FAM. LXIV.—CERAMBYCIDÆ.

Mentum variable, in *Prionidæ* usually very transverse and entirely corneous, in the others trapezoidal, more or less transverse, frequently coriaceous at tip; ligula membranous or coriaceous, sometimes (*Prionidæ*, a few *Cerambycidæ*, and *Methiini* of *Lamiidæ*) corneous; labial palpi 3-jointed.

Maxillæ with two lobes, clothed at the tip with bristles, the inner one obsolete in *Prionidæ*.

Mandibles variable in form, sometimes (*Mallodon* ♂, *Dendrobias* ♂) very long; usually curved and acute at tip, rarely emarginate, or chisel-shaped (*Distenia*).

Eyes usually transverse, most frequently deeply emarginate, often divided, in which case the upper lobe is sometimes wanting (*Tillomorpha*, *Spalacopsis*); either finely or coarsely granulated.

Antennæ variable in position, either in front of or between the eyes, in the latter case frequently on large frontal elevations; usually long and slender, imbricate in *Prionus* (pectinate in some foreign genera), subserrate or compressed in a few forms, with sensitive surfaces differing in the subfamilies and tribes; usually 11-jointed, sometimes 12-25-jointed (*Prionus*), very rarely 10-jointed (*Methia*, *Dysphaga*).

Prothorax margined in *Prionidæ*, not margined in any others in our fauna; coxal cavities and coxæ variable.

Mesosternum short, side pieces most frequently attaining the coxæ; sometimes (certain *Cerambycidæ* and *Lamiidæ*) cut off by the apposition of the sternal pieces.

Metasternum moderate, or long, short only in apterous *Lamiæ* (*Dorcadioides*), and in some subterranean foreign genera; episterna variable; in many *Cerambycidæ* with an opening for the duct of a scent gland near the inner hind angle.

Elytra usually covering the abdomen, rarely short; epipleuræ usually distinct, rarely (some *Phytœciini*) indistinct.

Abdomen with five free ventral segments, the sixth visible in many males, and occasionally in both sexes.

Legs variable, usually slender, thighs frequently strongly clubbed, hind coxæ transverse, frequently inclosed externally by prolongation of epimera of metathorax. Tarsi with joints 1-3 furnished beneath with brushes of hair, sometimes wanting on the 1st and 2d joints of hind tarsi; 3d joint emarginated or bilobed, 4th joint nodiform, small, connate with 5th joint; claws simple, rarely (*Phytœciini*) appendiculate or cleft, paronychium slender and distinct in *Prionidæ*, wanting in the others.

A great family, containing an immense number of species, which live in the larval state exclusively on the woody parts of plants. The species are remarkable for large size, beauty of color, or elegance of form, and have been, on these accounts, great favorites with collectors. Nevertheless their classification, and even the definition of the family, present difficulties which have been called insuperable by every systematist who has yet attempted the task.

The species are easily recognized, the chief variations being only those of size, dependent probably on the quantity of food obtained by the larva, or the excellence of its digestive power. At any rate, the differences appear to be individual and not indicative of races. The genera are, on the other hand, extremely indistinct, as at present recognized, for the reason that the species frequently differ not only by the usual specific characters of form, color, sculpture, &c., but by structural peculiarities of considerable moment, sometimes sexual, sometimes asexual. By regarding these peculiarities as of generic value, the number of genera (as in birds) has been vastly and unnecessarily increased, and the system of classification correspondingly diluted, so that the more essential points of resemblance between allied forms are lost sight of, and the arrangement becomes quite artificial. Frequent reference will be made in the following pages to the misplacement of genera by the best authorities; and, also, what tends to greater confusion, to errors of description in several of our genera, which lead to an incorrect appreciation of their relations.

Several characters which have been recently adopted for the

differentiation of tribes seem to me to be of but small, or still worse, illusory importance; and among these, the extension outwards of the middle coxæ, so that they attain or not the episterna is one of the most indefinite, and I have, therefore, rejected it as far as possible in the following scheme.

I have, in common with previous investigators, failed thus far to find any distinct difference capable of expression in words between this family and Chrysomelidæ. One familiar with the subject will rarely if ever mistake one for the other. But so far the essential difference between the Tetramera, of which the larvæ feed upon wood, and those feeding upon cellular vegetable tissues has eluded observation. I can merely at present observe that a slight approximation to it seems to be made in the fact, that in the Cerambycidæ there is a tendency in the epimera of the metathorax to extend to the sides of the ventral segments, while in the Chrysomelidæ the 1st ventral is prolonged forwards at the sides to meet the metathorax; thus showing probably a lower, though necessarily more recent, type, which could have existed only since the development of the higher broad-leaved plants.

And in continuation of this same subject, I would refer the difficulties of classification of the Longicorns to the fact, that being exclusively feeders upon woody tissue, and passing a very long period in the larval state, in the interior of trunks or branches of trees, protected against inundations by the buoyancy of their juvenile homes, they have been peculiarly qualified, not only for an early introduction, but prolonged existence; and that we, therefore, have here a more perfect record than is likely to occur in any other land animals. Among marine objects frequent examples occur of the representation in the existing fauna of forms more fully represented in previous geologic periods; but this is the first instance in which we have had occasion to note the probability of its occurrence in the Coleoptera. I have already alluded to this subject,\* specially in connection with the Spondylidæ, and have been very glad to find that the idea has been approved of by my friend H. W. Bates†, the distinguished explorer of the Amazon, in words so expressive that I cannot forbear quoting them.

\* An attempt to Classify, &c., Journ. Acad. Nat. Sci. 2d, II. 99, (1851).

† Contributions to an Insect Fauna of the Amazon Valley, Coleoptera, Longicornes, Part I. Lamiaires, p. 5-6 (from Annals and Mag. Nat. Hist. 1861).



"It is one of those groups of insects in which nature, in striving after strong individuality in the species, seems to have changed or adapted those parts of structure upon which we rely for characters of genera and groups of genera. The family, too, is found throughout all parts of the world where woody vegetation exists, and has endured, probably, under the same laws of modification, throughout long geological periods. The diversity of specific forms seems endless, running into infinite varieties of grotesque, ornamented, and extraordinary shapes; and nearly every species has structural peculiarities for its specific characters; so that in no family can genera be made so easily and numerously as here. Analysis is too easy, and has already been pushed, perhaps, to too great an extent."

This family comprises three sub-families, as follows :—

Prothorax margined; labrum connate.

PRIONIDÆ.

Prothorax not margined; labrum free.

Front tibiæ not grooved.

CERAMBYCIDÆ.

Front tibiæ obliquely grooved on the inner side.

LAMIIDÆ.

#### Sub-Family I.—PRIONIDÆ.

The insects of this sub-family are generally of large size, containing in fact the longest Coleoptera known; the color is brown or black, and the elytra usually coriaceous in appearance, becoming metallic and of firmer consistence in some of the genera, with finely granulated eyes. The labrum is connate with the epistoma. The ligula is always entirely corneous, without distinct paraglossæ; the supports of the labial palpi are connate with the ligula. The mandibles are strong, frequently elongated in the males, and are destitute of membrane or molar tooth. The lobes of the maxillæ are small, the inner one obsolete, and the last joint of the palpi is triangular. The antennæ are furnished with poriferous spaces, varying according to the genus and tribe. The prothorax is always distinctly margined, the front coxæ are transverse, with distinct trochantin.

The mesonotum never has stridulating surfaces, such as are seen in most other Cerambycidæ; some of the species, however, have the epipleuræ covered with fine transverse lines, and a noise is produced by rubbing the hind femora against the edge of the

elytra, a phenomenon of which the first record has been made by Mr. C. V. Riley.\*

Our species fall naturally into the following tribes:—

Eyes strongly granulated;

I. Prothorax pluridentate on the side;

3d antennal joint very long.

ERGATINI.

3d antennal joint moderate.

MALLODONTINI.

II. Prothorax parcidentate on the sides;

Metathoracic epimera parallel;

Antennæ filiform.

DEROBRACHINI.

Antennæ imbricate.

PRIONINI.

Metathoracic epimera narrowed behind.

TRAGOSOMINI.

III. Eyes finely granulated.

SOLENOPTERINI.

#### Tribe I.—ERGATINI.

One species, *Ergates spiculatus* Lec. of large size (55–63 mm. long), is not uncommon on the maritime Pacific slope and in New Mexico. The tribe is easily known by the prothorax being much broader in the male than in the female, and finely punctured; in the latter sex the sculpture is very coarse, and the small teeth of the lateral margin longer and more acute. The head is small, the eyes reniform and coarsely granulated; antennæ 11-jointed, slender, two-thirds the length of the body in the ♂, about half the length of the body in the ♀, rough with elevated punctures, with the 3d joint as long as the three following united; poriferous spaces on the 3d joint small inconspicuous, on the under surface near the distal end, gradually becoming larger, until the outer joints become entirely poriferous, and irregularly reticulated with fine elevated lines forming elongate cells, which are much less distinct, and in fact hardly to be seen in the male.

The generic characters are not sufficiently distinct from the European species *E. faber* to warrant the retention of the genus *Trichocnemis* proposed in my earliest description of this insect.

#### Tribe II.—MALLODONTINI.

This tribe contains also species of very large size (one from Florida in my collection is 61 mm. long), with the sides of the prothorax armed with numerous small teeth. The head is com-

\* Canadian Entomologist, iv. 139.

paratively large, the eyes strongly granulated, distant, transverse, feebly emarginate; the antennæ are slender, half the length of the body in the ♂, shorter in the ♀, sparsely and coarsely punctured; the 3d joint is scarcely longer than the 4th; poriferous spaces commencing on the under surface at the distal end of the 3d joint, gradually becoming larger until they cover the outer four joints, which are sculptured with fine longitudinal elevated lines.

The prothorax frequently differs in the two sexes, being nearly quadrate in the ♂, densely punctured with smooth separate facets, narrowed in front in the ♀, more coarsely punctured towards the sides, uneven on the disk.

The species form two groups: 1. Mandibles nearly horizontal, prolonged in the ♂. 2. *Apagiognathus* Thom. mandibles vertical. These characters do not seem to be of generic value.

*M. gnatho* Lec. from Texas belongs to the 1st group, and is further distinguished by the metathoracic episterna having the inner outline concave; this form is recognized by Lacordaire as a distinct genus, *Nothopleurus* (l. c. viii, 125), but the difference scarcely merits such separation; in the ♂ the metasternum has two large densely villous spaces, in the ♀ the same portion is clothed with long soft pubescence.

### Tribe III.—DEROBACHINI.

In this tribe the form is somewhat more slender than in the preceding; the head is smaller, the eyes coarsely granulated, very large, transverse, reniform, and approximate, both above and below, somewhat larger in the males than in the females. The mandibles are horizontal, acute, and alike in both sexes. The antennæ are 11-jointed, nearly filiform in the ♀, thicker at the base in the ♂. The sensitive pores commence on the outer half of the 3d joint, and cover the whole surface of the 4th and following joints, arranged in longitudinal grooves, separated by fine elevated lines. The prothorax is alike in both sexes, armed with three acute teeth on each side, the front one of which is in *D. geminatus* double, and occasionally even divided into two large teeth, so that the thorax becomes really 4-dentate. The legs are slender, sparsely punctured with the hind femora deeply sulcate beneath in *Derobrachus brevicollis*; densely punctured, some-

what rough in *D. geminatus*; hind femora less deeply sulcate beneath, and with several short elevated ridges on the inner surface in *Orthosoma*. In both genera the narrow epipleural portion of the elytra is transversely striate, forming a stridulating organ upon which the ridges or edges of the hind femora grate to produce a sound.

Among our three species I recognize but two genera, *Dero-brachus* and *Orthosoma*, distinguished sufficiently by the characters above given. *Braderochus* Buquet, to which *D. geminatus* Lec. has been referred, does not seem to me sufficiently distinct. Besides the sexual characters above mentioned, the 5th segment in the ♂ of *Dero-brachus* is broadly emarginate, the 6th visible and also emarginate; and the last dorsal is truncate and emarginate; the 5th ventral is elongate and truncate in the ♀, but the 6th is not visible.

In *Orthosoma* the 5th ventral is rounded in the ♀, but broadly truncate in the ♂, leaving the 6th visible.

The distribution of the species is as follows:—

*Dero-brachus brevicollis*, Southern States.

*D. geminatus* from Texas, through Arizona to Lower California.

*Orthosoma brunneum* Forst. (*cylindricum* Fabr.), is generally distributed over the Atlantic States.

#### Tribe IV.—PRIONINI.

In this tribe the mandibles are moderate in size, acute, and similar in both sexes. The eyes are coarsely granulated, usually large, transverse, convex, and approximated. The antennæ have from 12–27 joints, varying according to species, the joints are conical and imbricated, much heavier in the ♂ than the ♀, the poriferous system commences on the 3d joint, and covers nearly the whole surface of the 4th and following joints. In *Prionus* ♂ and ♀ the sensitive surface is reticulate, with fine elevated lines, but in *Homæsthesis* ♂, the surface is quite uniform. The sides of the prothorax are armed with 3 acute teeth in *Prionus*, but in *Homæsthesis integra* and *emarginata* the apical and basal teeth are obsolete, so that the sides become unidentate.

*P. palparis* Say, has the form of *Prionus*, but the antennæ are as in *Homæsthesis*.

The narrow epipleural margin is striate transversely, and stridulation is produced by rubbing against this surface the sharp

edge of the hind femora, which are flattened and sulcate beneath. The legs are slender, compressed, and punctate.

The sexual characters are obvious in the antennæ, heavy in the ♂, slender in the ♀. In some of the species the abdomen in the last-named sex is enlarged, and the intercoxal process is so broad as to show that the character possesses not even a generic value; the division *Prioni subterranei* of Lacordaire has therefore no foundation in nature, and its contents should be distributed according to the affinities of the individual genera. The 5th ventral segment in the ♂ is truncate and broadly emarginate, so that the 6th is visible; in the ♀ it is more elongate, gradually narrowed behind and truncate, and the 6th segment is not exposed.

Our genera are but two in number, *Prionus*, containing several species, occurs in every part of the country; *Homæsthesis* (*P. integer* Lec., *emarginatus* Say) found in Colorado and New Mexico. *P. innocuus* Lec. is the female of one of these species, probably *emarginatus*; the hind coxæ are very widely separated, and the intercoxal process of the 1st ventral segment is very short and wide.

There is much difference in the soles of the hind tarsi, which sometimes, as in *P. brevicornis*, are as thickly clothed with hair as the other feet and marked with a narrow medial groove; sometimes, as in *P. palparis* and *Homæsthesis*, flattened or broadly concave and nearly naked; sometimes again, as in *P. fissicornis* and *imbricornis*, the covering of hair is thin, so that the joints appear punctured, with a narrow smooth medial groove.

We see, therefore, in this genus that structural characters assume a merely specific importance, a fact which must be constantly borne in mind in attempting a rational classification of Cerambycidæ.

#### Tribe V.—TRAGOSOMINI.

This tribe is represented in our fauna by *Tragosoma Harrisii*, which scarcely differs from the North European *T. depsarium*; it occurs from Newfoundland to Vancouver Island, but is not abundant. The body is elongate (30–35 mm. long); the prothorax alike in both sexes, very hairy, and armed on the side with a single acute tooth. The elytra are punctured and finely ribbed.

The poriferous system of the antennæ of the ♀, which are

slender nearly filiform, and slightly compressed, commences on the 3d joint, on the under surface, and gradually increases, covering the whole of the joints beyond the 6th, and appears like a fine dense punctuation. The head is small, the eyes large, coarsely granulated. The legs are slender, finely punctured, and hairy. The side pieces of the metathorax are triangular, broad in front, pointed behind. The abdomen is gradually narrowed behind, with the 5th ventral segment truncate; the intercoxal process is acute.

#### Tribe VI.—POECILO SOMINI.

This tribe contains all Prionidæ with finely granulated eyes, and is represented in our fauna by single species of two genera, belonging to the group Solenopterae. In the specimens before me, which are females, the poriferous system of the antennæ consists of a few irregular scar-like depressions on the outer joints.

The head is small, much narrower than the prothorax, which is trapezoidal, smooth, and obtusely toothed near the base; very roughly punctured and acutely toothed behind the middle in *Elateropsis*. In both genera the prosternum is deeply emarginate behind for the reception of the mesosternum, which is also emarginate behind.

*Sphenostelhus Taslei* (serripennis Hald.), occurs in the Middle Atlantic States. *Elateropsis fuliginosus* occurs only in the southern point of Florida, whither it has extended from Cuba.

#### Sub-Family I.—CERAMBYCIDÆ (genuini).

The only characters I can give to define this sub-family are those already set forth in my first paper on this series of Coleoptera,\* viz.: Prothorax not margined, front tibiæ not obliquely sulcate, labrum separate from the front, palpi never acute at tip; to which may be added, antennæ always pubescent, never glabrous with corrugated and extensive sensitive surfaces as in Prionidæ.

Utilizing the improvements suggested by Thomson,† myself,‡

\* An attempt to classify the Longicorn Coleoptera of the part of America north of Mexico. Journ. Acad. Nat. Sci. Phila., 2d s., 311.

† Famille des Cerambycoides, par M. James Thomson, Paris, 1860.

‡ Note on Classification of Cerambycidæ, Proc. Acad. Nat. Sci. Phila., 1862.

Schiödt,\* and Lacordaire.† I have constructed the following table as exhibiting the more obvious relations between the tribes represented in our fauna. The cross relationships can of course only be indicated in the more detailed descriptions which follow, and I am far from believing that the arrangement here adopted can be extended to the immense number of genera found in other countries, with any better success than the two classifications previously devised by me.

The tribes of the Cerambycidæ genuini may be arranged as follows: the series are indicated very plainly, but can hardly be definitely restricted; the tribes seem to be limited tolerably sharply, though the cross affinities are frequently perplexing when an attempt is made at a linear arrangement.

- I. Base of antennæ not enveloped by the eyes; antennæ with the 2d joint rather large, front coxæ transverse, not prominent.

CALLIDIODES.

Ligula corneous, eyes variable.

I. ASEMINI.

Ligula membranous, eyes finely granulated.

II. CALLIDIINI.

- II. Base of antennæ partly enveloped by the eyes; front coxæ not conical, though sometimes prominent; stridulating plate (absent only in *Molorchus*) large, never divided; ligula membranous (except in the group *Oemes*); 2d joint of antennæ small (except in one genus of *Clytini*).

CERAMBYCOIDES.

Eyes coarsely granulated, front coxal cavities open behind (except in *Compsa*).

III. CERAMBYCINI.

Eyes variable, front coxal cavities angulated, closed behind.

IV. OERIINI.

Eyes finely granulated;

a. Scutellum rounded, tibial spurs small; elytra not sinuate;

Legs long slender, thighs pedunculated and suddenly clavate; front coxal cavities open behind;

Antennæ with poriferous system.

V. AECTLOCERINI.

Antennæ without poriferous system.

VI. RHOPALOPHORINI.

Legs slender, thighs not pedunculated, nor clavate, front coxal cavities open behind;

Front coxæ rounded.

VII. PTEROPLATINI.

Front coxæ transverse, cavities angulated.

VIII. ROSALINI.

\* On the Classification of Cerambyces, with particular regard to the Danish fauna, by Prof. J. C. Schiödt, *Naturhist. Tidsskrift*, 3d, ii, 483, (1864); translated in *Annals and Mag. of Nat. Hist.*, 1865.

† *Genera des Coléoptères*, Vol. viii, Paris, 1869.

- b. Scutellum acutely triangular; elytra not sinuate;  
 Front coxal cavities closed behind. IX. CALLICHBOMINI.  
 Front coxal cavities open. X. TRACHYDERINI.
- c. Scutellum rounded, or broadly triangular (Cyllene); tibial  
 spurs large; thorax never tuberculated, nor spinose;  
 elytra not sinuate;  
 Tibiæ carinated. XI. STENOSPHEENINI.  
 Tibiæ not carinated. XII. CLYTINI.
- d. Scutellum broadly rounded; thorax not tuberculate nor  
 spinose; sides of elytra deeply sinuate near the humeri.  
 XIII. AGALLISSINI.
- III. Base of antennæ partly enveloped by the eyes, which are nearly  
 divided, and moderately finely granulated; 2d joint of antennæ  
 longer than usual; front coxæ globose, widely separated; stridu-  
 lating plate of mesonotum divided by a smooth furrow. (Body  
 resembling a Lamiide.) ATIMIOIDES.
- XIV. ATIMINI.
- IV. Base of antennæ not enveloped by the eyes, which are entire or  
 emarginate, and usually finely granulated; front coxæ conical  
 except in Disteniini; stridulating plate of mesonotum divided  
 by a smooth space or furrow. LEPTUROIDES.
- A. Mandibles scalpriform, not fringed. XV. DISTENIINI.
- B. Mandibles simple, not fringed. XVI. DESMO CERINI.
- C. Mandibles acute, fringed on the inner margin.  
 Elytra abbreviated. XVII. NECYDALINI.  
 Elytra not abbreviated;  
 Front nearly vertical. XVIII. ENCYCLOPINI.  
 Front oblique or horizontal. XIX. LEPTURINI.

#### Tribe I.—ASEMINI.

This series contains the genera in which the ligula is corneous, with the supports of the labial palpi fixed and connate, not retractile; the eyes are usually coarsely granulated, but sometimes (Aseum, Tetropium, and Opsimus) the granulation is very fine; the antennæ are sometimes short, sometimes long, densely punctured and pubescent, and do not usually have any well-defined sensitive spaces, the 2d joint is always half as long as the 3d, and the 11th is simple; the front coxæ are generally transverse and angulated externally, with distinct trochantin, and the cavities are always open behind; the middle coxal cavities open externally; the side pieces of the mesosternum do not intervene between the sterna; the mesosternum is bent down behind but not acutely emarginate for the reception of the inter-



coxal process; the episterna of the metathorax are narrowed and almost pointed behind, and the epimera are not longer than the episterna.

In the ♂ the 5th ventral segment is transverse, and the 6th is visible, in the ♀ the 5th is prolonged, and 6th not visible.

The scutellum is always rounded behind; the mesonotum is punctured at the sides, the stridulating plate is wanting in *Tetropium*; feebly developed, and divided by a broad median vitta in *Criocephalus*; tolerably large and channelled in *Aseum* and *Nothorhina*; large and undivided, as in most *Cerambycini*, in *Opsimus*, and *Smodicum*.

An undifferentiated, or synthetic tribe, having affinities in various directions; the maxillary lobes are very feebly developed, and almost atrophied in *Aseum*, showing an affinity with *Spondylis* and *Prionidæ*; the divided stridulating plate indicates a relation with *Lepturini*; *Tetropium* diverges towards *Callidium*, *Criocephalus* with its coarsely granulated eyes tends towards the genuine *Cerambycini*, while *Opsimus* and *Smodicum* seem to be entirely isolated, having no relation with other members of our fauna.

The groups may be thus separated.

Epimera of mesothorax normal, truncate at inner end;

Base of prothorax normal.

**Aseml.**

Base of prothorax emarginate, filled by a thin plate.

**Opsiml.**

Epimera of mesothorax acutely pointed internally.

**Smodicl.**

#### Group I.—**Aseml.**

The insects of this group are generally Callidioid in form, the head short, the mandibles small, stout, and acute, the palpi nearly equal, or rarely unequal (*Tetropium*); the eyes finely or moderately coarsely (*Criocephalus*) granulated, transverse, scarcely emarginate (*Aseum*), large, more or less emarginate (*Criocephalus*), divided (*Tetropium*).

All the genera except *Cyamophthalmus*, which has the last joint of the palpi subulate, are represented in our fauna, and are distributed on both sides of the continent.

Eyes moderate, transverse, finely granulated, hairy;

Antennæ finely pubescent.

**Aseum.**

Antennæ coarsely pubescent.

**Nothorhina.**

Eyes large, coarsely granulated, not hairy.

CRIOCEPHALUS.

Eyes divided, rather finely granulated.

TETROPIUM.

To Nothorhina belongs *Asemum asperum* Lec., from Oregon and Vancouver. From *Asemum* must be excluded *A. australe* Lec., which is an anomalous Criocephalus, differing from all the others by the eyes being deeply emarginate.

#### Group II.—*Opsini*.

*Opsinus quadrilineatus* Mann., from Alaska and Oregon, constitutes this group; it is a lead-colored, finely pubescent insect, having the prothorax armed with a lateral acute spine, and the disk of the elytra with several vague impressions. The antennæ are punctured and coarsely pubescent, as long as the body; the head is short and perpendicular in front; the eyes narrow, emarginate so deeply as to be completely divided, not finely granulated; the palpi are unequal, the labial short, the maxillary elongate, last joint triangular, obliquely rounded at tip; the front coxæ are large, globose, and contiguous, scarcely angulated externally, the lateral fissure being only narrowly open; the middle coxal cavities are angulated externally, but the sternal pieces come in contact so as to cut off the episterna; the episterna of the metathorax are wide in front, narrowed and pointed behind; the legs are stout, the thighs strongly clavate, the spurs small, and the 1st joint of hind tarsi longer than the two following united.

The singular character which distinguishes this from all other groups is, that the thickened hind margin of the prothorax is broadly emarginate in the arc of a circle, and the emargination filled with a thin corneous plate. The mesonotum is punctured each side, with a very broad and flat, extremely fine, stridulating surface.

#### Group III.—*Smodici*.

*Smodicum cucujiforme* (Say), a small narrow depressed pale-yellow species, found under bark in the Atlantic States, constitutes by itself a distinct group, characterised by the mesothoracic epimera being narrowed and acutely pointed inwards; the middle coxal cavities are widely open externally.

The front is broad, short, and perpendicular, the eyes coarsely granulated, very deeply emarginated; the mandibles small,

pyramidal, and entire, the genæ very short; the palpi are short, equal, not dilated; the mentum is narrowed and rounded in front, and the ligula appears to be of a corneous consistence, with the supports of the labial palpi less distant than usual and connate. The antennæ are polished, very sparsely punctured and pilose, and have two obscurely defined sensitive spots near the extremity of the 5th and following joints; they are scarcely as long as the body in the ♂, shorter and more slender in the ♀.

On the under surface of the prothorax is seen on each side a large reniform impression, which is opaque, coarsely punctured and slightly hairy, and which according to Lacordaire is wanting in some exotic species; the front coxal cavities are small, quadrate, not angulated externally, widely open behind; the prosternum is rather broad. The mesosternum is broad, flat, and truncate behind; the ventral segments 1-4 diminish gradually in length, the 5th is very short, and broadly subemarginate in ♂, narrower and elongate in ♀.

The genus *Smodicum* seems more allied to *Asemum*, than to *Atimia*, with which it has been associated by Lacordaire.\* The eyes are coarsely granulated in *Smodicum*, and very finely in *Atimia*; the front coxal cavities open in the former, and closed in the latter. The one is an undifferentiated form of typical *Cerambycidæ*, the other an anomalous form leading to some of the *Lamiide* groups.

#### Tribe II.—CALLIDIINI.

A tribe containing species usually depressed, and rarely slender in form; the prothorax and elytra are never spinose. The eyes are finely granulated, deeply emarginate, but do not embrace the base of the antennæ; the head rather small, with the front short, perpendicular, or nearly so; mandibles short, stout, acute, genæ moderately long; palpi usually very unequal, dilated. Antennæ with the outer joints sericeous, or punctured, without distinct poriferous spaces; the 2d joint not as large as in *Asemini*, but longer than usual. Front coxal cavities transverse, very strongly angulated, with large trochantin, open behind; prosternum variable; middle coxal cavities open externally; mesosternum some-

\* Gen. Col. ix, 143.

times wide and emarginate behind, sometimes triangular and pointed, side pieces large; metasternum with side pieces wider than usual. Legs moderate in length, thighs generally strongly clubbed, 1st joint of hind tarsi at least twice as long as the 2d. Abdomen with ventral segments slightly diminishing in length, 5th, in ♂, short subemarginate.

The antennæ, in ♂, are usually longer than the body, and thicker at base than in ♀. Flying hairs are seen on the legs and antennæ, and frequently on the body.

As in the Stenopteri, there are mute and sonant genera, and according to the sculpture of the mesonotum they may be arranged as follows:—

A. Mesonotum with a large, undivided, very finely striate stridulating surface.

Hind coxæ not prominent, thighs slender. GONOCALLUS.

Hind coxæ very prominent, thighs strongly clubbed; metasternum with scent pores;

Elytra with ivory lines.

PHYSCHENUM.

Elytra uniform.

RHOPALOPUS.

Hind coxæ not prominent; metasternum without scent pores;

Prosternum broad or moderate, hind coxæ inclosed by side pieces and 1st ventral segment.

HYLOTURPES.

Prosternum very narrow, pointed, hind coxæ not inclosed; prothorax rounded.

PHYMATODES.

B. Mesonotum polished, with large scattered punctures;

Mesonotum broad, emarginate.

MERIUM.

Mesonotum obtusely triangular.

CALLIDIUM.

C. Mesonotum punctured and pubescent at the sides, with a medial stridulating surface.

XYLOCIUS.

Gonocallus is established on *C. collare* Kirby (lepidum *Lec.*), a very anomalous species with slender thighs, and the ♂ antennæ 12-jointed. It is an annectant branch towards Stenosphenus and Clytus.

Semanotus does not appear in the above scheme, as the former representative of the genus in our fauna, *C. ligneum* Fabr., appears to me more naturally placed as a section of Hylotrupes, differing merely by the sternal pieces being less dilated.

I have retained Merium Kirby, because the type *M. Proteus*, though agreeing with Callidium in the sculpture of the mesonotum, differs essentially in the form of the mesosternum; the sculpture

is also different, there being indications, more or less distinct, of two ivory vittæ on each elytron.

Curious sexual differences appear on the under surfaces of the prothorax in *Phymatodes* and *Callidium*; the punctures are coarser and more numerous in ♂.

*Xylocrius Lec.* is founded upon *Callidium Agassizii* Lec. (Proc. Acad. Nat. Sci., 1861, 357), a black coarsely punctured species, from California; it is of more convex form than usual in this group, the antennæ are shorter and stouter with joints 3-5 equal, the palpi unequal, the prosternum narrow and pointed behind, the mesosternum subtriangular, obtusely truncated and slightly emarginate at tip, the hind coxæ not inclosed by the side pieces of metasternum. The scutellum is triangular with curved sides, and the mesonotum, though provided with a medial stridulating surface, is punctured and pubescent at the sides. The hind tarsi are stouter than in the other genera of this group, and the thighs are moderately clubbed.

### Tribe III.—CERAMBYCINI.

A very extensive series, of rather difficult definition, and containing a large number of genera, which seem to have been unnecessarily multiplied, on account of the unimportance of the characters used for the definition of the separate groups. As here restricted, the tribe contains all of the groups of Section A. (Lac. Gen. Col. viii, p. 202), which are represented in our fauna, except *Asemini* and *Obrini*; in other words, all genera having the eyes strongly granulated, the front coxal cavities usually open, the abdomen normal in both sexes, and the antennæ with the 2d joint small.

The ligula is sometimes (Oeme, etc.) corneous, but usually membranous, and deeply bilobed; the scutellum is usually rounded, rarely (*Chion*) triangular and acute; the stridulating surface is fine, and covers nearly the whole mesonotum; the antennæ are nearly always long, and without distinct sensitive spaces. The mandibles are acute at tip. The middle coxal cavities are sometimes open, sometimes closed, varying frequently, to an appreciable extent, in the species of the same genus. The elytra, as observed by Lacordaire, are not abbreviated, but they are slightly so in *Gracilia manca*; the eyes are not divided in any

of our genera, though always deeply emarginated, and embracing the antennal tubercles.

Group I.—*Oemes*.

The ligula is more or less corneous, and usually only emarginate at tip; though in *Achryson*, corneous, with the front part membranous, and broadly bilobed; the body is slender and elongate, the palpi frequently very unequal, the antennæ usually long, and longer than the body in ♂; the eyes are usually very large, convex, coarsely granulated, and very deeply emarginated. The thighs are rather slender, except in *Gracilia*, where they are strongly clavate.

Three sub-groups are indicated,

*Epimera* of mesothorax large;

Front trochantins very distinct.

Front trochantins not visible.

*Epimera* of mesothorax small.

*OEMES*.

*ACHRYSONES*.

*GRACILIS*.

Sub-Group 1.—*OEMES*.

*Oeme rigida* (Say), from the Middle and Southern States, and two new genera, *Ganimus*, and *Eucrossus* from Arizona, represent this sub-group in our fauna; they are pale brown, slender insects, with the antennæ hairy beneath; rough with small acute tubercles on the under surface of the 3d, 4th, and 5th joints in *Oeme*; these joints in *Eucrossus* are not rough, but are armed on the inner side with a terminal spine; the prosternum is very narrow and prolonged in *Oeme*; moderate in width in *Eucrossus*; the mesosternum is narrow in *Oeme* and *Ganimus*, wider and truncate in *Eucrossus*; the palpi are dilated in the latter two, but scarcely so in the former, very unequal in all.\* The prothorax is strongly constricted at base in *Oeme*, but in *Ganimus* is transverse, more rounded on the sides, and not constricted at base.

The sculpture of the prothorax of the ♂ in *Eucrossus* is peculiar; finely alutaceous, opaque, with a smooth dorsal vitta, and a large scar-like mark each side, nearly parallel with the dorsal line, commencing near the base, suddenly inflexed just in front of the middle, and then abbreviated.

\* Lacordaire, l. c. viii, 222, says that the palpi are subequal in *Oeme*, but his specimen seems to have been much mutilated.

The episterna of the metathorax in Oeme and Eucrossus are triangular, wide in front, and pointed behind, as in Criocephalus.

The species *E. villicornis* is 18 mm. long, of a pale-brown color; with the elytra feebly punctured, clothed with erect pubescence, marked with two very faint lines, and armed with a small subsutural spine at tip; the joints of the antennæ from the 3d are clothed beneath with a dense fringe of hair, becoming thinner to the 8th, where it disappears.\*

The essential characters of this sub-group are in the front coxæ being prominent, very strongly angulated externally, with large trochantin; the middle and hind coxæ are also prominent; the 5th ventral of the ♂ is as large as the 4th and emarginate at tip in Oeme; equally large and truncate in Ganimus; small and truncate in Eucrossus.

The genera may be distinguished as follows :—

Palpi very unequal, dilated;

Prosternum laminiform; antennæ rough with elevated points; mesosternum very narrow;

Prothorax lobed at base.

GANIMUS.

Prothorax constricted at base.

OEME.

Prosternum not laminiform; antennæ very hairy beneath, joints 3-6 with a terminal spine;

Body uniformly pubescent.

EUCROSSUS.

Body with transverse bands of yellow pubescence.

DRYOBIOUS.

Palpi short, equal, slender;

Front coxæ contiguous, hardly prominent; middle coxæ distant.

HAPLIDUS.

The position of Dryobius is doubtful; the eyes are almost finely granulated, and the front coxal cavities much less angulated externally, but the affinities seem to be stronger than with any other group. The type and only species is *Callidium sexfasciatum* Say, a rare insect of the Mississippi valley.

*Haplidus* is founded upon *H. testaceus* Læv., a slender finely pubescent brown insect, without any striking characters; it occurs in California and Utah, and the affinities of it seem to me also doubtful.

\* *Ganimus vittatus* resembles in form Oeme, and the antennæ are almost equally rough; but the prothorax is not constricted behind, and has a broad basal lobe as described in the African genus *Hypæschrus*, with which it further agrees in having the middle coxæ very large and nearly contiguous, but differs by the palpi being very unequal.

## Sub-Group 2.—ACHRYSONES.

Slender sub-cylindrical species, with slightly dilated palpi; the head short, and front perpendicular as in *Oemes*; the front coxæ globose, prominent (contiguous in *Achryson*), not angulated externally, trochantin not visible; the middle coxæ are also prominent, closed externally, the mesosternum is moderately wide, truncate at tip in *A. surinamum*, narrow and sub-triangular in the Texan *A. concolor*; the elytra are armed with a terminal spine in the former, but are rounded in the latter. The 5th ventral segment of ♂ is truncate, but not shorter than the 4th.

*A. surinamum* (Linn.), (*S. circumflexus* Fabr.) is found from the Middle States to Mexico and South America; it is a slender pale-brown insect, with dark angulated lines on the elytra.

## Sub-Group 3.—GRACILIA.

Very small slender species of piceous color, very finely punctured and pubescent, constitute this sub-group. The head is short, as in the other sub-groups, the palpi very unequal, the labial short, the maxillary long with the last joint triangular, obliquely truncate so as to appear pointed; eyes large, coarsely granulated, deeply emarginate, almost divided; front coxæ very prominent, nearly contiguous, the prosternum being narrow, and pointed behind; the coxal cavities are sub-quadrate; the middle coxæ are prominent, separated by the triangular mesosternum, the cavities are angulated externally, but the epimera are very small, and do not fully reach the coxæ; the episterna of the meta-thorax are linear; the 1st ventral segment is somewhat longer than usual. The legs are short, the thighs thick and clavate, the 1st joint of the hind tarsi longer than the 2d and 3d.

The mesonotum is covered with stridulating surface; it is less transverse than usual, nearly quadrate, and finely margined at the sides.

The antennæ are hairy, in ♂ longer, in ♀ shorter than the body. *Gracilia pygmaea* has been introduced in articles of commerce from Europe. *G. manca* is very rare in the Middle States, and differs by the prothorax being more rounded on the sides, and the elytra a little shorter than the abdomen.



Group II.—*Cerambyci*.

This group contains a large number of genera, which have been partitioned by Lacordaire into several minor groups, separated by evanescent or variable characters. Although the typical genera of these smaller groups possess in every instance a distinct appearance by which they may be recognized, yet the structural variations observed even within the limits of the genera themselves, when the species are numerous, are such as to completely prevent any definition of these minor divisions. For the information of the general student, I will mention below the groups of Lacordaire to which he has referred, or would refer the genera represented in our fauna.

I have placed in this group all those genera with coarsely granulated eyes, having the ligula entirely membranous and deeply bilobed, and the middle coxæ more or less angulated externally, even when the two sternal plates come into contact. The other characters are all variable to a greater or less degree, as will be seen by the following table. The metathoracic episterna have in many species a distinct aperture near the hind coxa, at the side of the metasternum, which is the orifice of the scent gland, but even in species of the same genus (*Elaphidion*) they vary greatly in size, so as almost, or even completely, to disappear. In the same manner the spines of the antennæ, of the femora, and of the elytra have rather specific than generic value. In *Eburia* there is a gradual transition from those species in which the lateral spines of the prothorax are acute and prominent to those in which they are entirely wanting.

Antennæ 11-jointed, with recurved hooks on joints 3—6, (prothorax plicate, armed, elytra bispinose). HAMMATICERUS.

Antennæ 12-jointed, sericeous, serrate.

AXESTINUS.

Antennæ 11-jointed;

A. Front coxal cavities angulated; antennæ, thighs, and elytra not spinose;

Frontal suture deep; metathorax without scent pores;

Prothorax uneven, tuberculate at the sides.

BROTETYLUS.

Prothorax even, (palpi equal).

STROMATIUM.

Frontal suture faint, scent pores distinct;

Elongate, prothorax even, antennæ very long.

OSMIDUS.

B. Front coxal cavities rounded, or feebly angulated;

a. Scutellum acute, triangular, frontal suture very deep; antennæ very long, sulcate;

Prothorax with lateral spine, but no dorsal callosities, elytra and thighs spinose at tip; episterna of metathorax wider in front, scent pores distinct. CHION.

b. Scutellum rounded behind;

\* Femora not strongly clubbed; antennæ not carinated;

Elytra with ivory spots, prothorax with dorsal callosities, and usually with lateral spines; elytra and thighs either spinose or unarmed; scent pores distinct; antennæ unarmed. EURIA.

Elytra without ivory spots, antennæ usually spinose;

Episterna of metathorax narrower behind, antennæ with sensitive spaces.

ROMALEUM.

Episterna of metathorax parallel; antennæ without sensitive spaces.

ELAPHIDION.

\*\* Antennæ carinated, femora not strongly clubbed;

Antennæ slender.

ANEFLUS.

Antennæ stout, joints excavated beneath.

EUSTROMA.

\*\*\* Femora strongly clubbed.

Antennæ bisulcate.

TYLONOTUS.

Antennæ not sulcate.

ZAMODES.

Hammaticherus is represented by *H. mexicanus* Thomson, which occurs in Lower California.

Axestinus is allied to Xestia, but is clothed with fine gray pubescence; the species *A. obscurus* is of large size (30 mill.), and occurs in New Mexico.

To Stromatium I would refer *Anophilum pubescens* Hald., it belongs to the division of the genus without pubescent spaces on the prothorax of the ♂; the disk is, however, more finely punctured in that sex than in the ♀, just as in Romaleum.

Osmidus contains an elongate species from Lower California, resembling in appearance Hesperophanes, and like many of the species of that genus, finely and densely pubescent, with round denuded slightly elevated spots on the elytra; the absence of the deep frontal suture seen in the neighboring genera is a remarkable character.

Romaleum *White* has distinct sensitive spaces on the antennæ, especially well marked in the ♀, commencing in a small depression on the outer face of the 4th joint. It contains all of our large species of Elaphidion, except *protensum*, which has carinated antennæ and tibiæ, and belongs to the genus Aneflus. The typical species of Romaleum is *Enaphalodes simplicicollis* Hald. (*Elaph. pulverulentum* Hald., nec *De Geer*). It corresponds with *Hyper-mallus* Lac. in part, but I have replaced the greater number of

the species mentioned by him in *Elaphidion*, as the differences in the sternum, upon which the genera were separated, seem to me to be of purely specific importance.

I have been disposed to retain *Anoplium* for the second species of Haldeman, *A. unicolor*, which has been fully described by Lacordaire; the first species being placed in *Stromatium*, the name is thus rendered disposable. But it seems to be so slightly different from *Elaphidion*, that it is more prudent to suppress it.

*Aneflus* contains *E. protensum* with the elytra bispinose, and *E. tenue, lineare*, etc., with the spines much shorter, or wanting.

*Eustroma* is founded upon *Elaph. validum* Lec., a large, stout species from Texas and Lower California, with short and stout antennæ, the intermediate joints of which are concave beneath; the antennal spines are short, and the femora and elytra are unarmed; the 4th joint of the antennæ is conspicuously shorter than the 3d or 5th; the sides of the prothorax have a large oval patch of dense yellowish pubescence in two specimens from Texas, but in another specimen it is much less distinct, and in one, from Lower California, it is not visible.

*Zamodes* contains a black species from Pennsylvania, of the same size and form as *Tylonotus*, but without callosities on the prothorax; the antennæ, legs, and general surface of the body are clothed with long, erect, flying hairs. From its strong resemblance in appearance to *Zamium Pascoe*, which is placed by Lacordaire in his group *Saphanides*, I have derived the generic name.

#### Group III.—*Ibidioides*.

The very elongate form, large and coarsely granulated eyes, and clavate thighs will easily distinguish the members of this group from all others in our fauna; in addition, it will be observed, that the front coxæ are small, rounded, and either inclosed, or a little open behind, the middle coxæ are not open externally and the cavities not at all angulated; the hind tarsi are slender, the 1st joint as long as the two following united. The front is small and perpendicular, the mandibles short, acute, the palpi somewhat unequal, short, dilated.

The antennæ are elongate, slender in the ♀, thickened at the base in ♂; sparsely punctured, and pubescent, not sericeous. The episterna of the metathorax are narrow, parallel, and have

very distinct scent pores near the hind end. Tibiæ not carinate in our species.

This group evidently belongs to the same series as the preceding, with which it connects closely, though assuming a form which is characteristic. The prothorax is very elongate and cylindrical, as in certain Elaphidion, but the antennæ are never spinose.

The two genera belonging to our fauna may be thus distinguished:—

Front coxal cavities closed behind.

COMPSA.

Front coxal cavities open behind.

HETERACHTES.

Of Compsa, two species are found in Lower California; the genus is easily distinguished by the character given above, and by the joints 3–6 of the antennæ being distinctly carinated; one of the species *C. puncticollis* Lec., is remarkable for the dull color, and coarsely punctured prothorax.

#### Group IV.—Curtl.

The singular characters of the two species of *Curius Newm.*, compel me to separate them as a distinct group, which is easily recognized by the coarsely granulate eyes, and very strongly clavate thighs, armed beneath with a broad tooth. The form is elongate, in the typical species depressed, dull, and slightly pubescent; in *C. scambus* cylindrical, polished, and glabrous, resembling *Ibidion*. The front is small, declivous, the antennal tubercles not prominent, the palpi somewhat unequal, the mandibles small and acute; the antennæ are slender, longer than the body, annulated, finely punctulate and pubescent. The front coxæ are globose, prominent, nearly contiguous in *C. dentatus*, separated in *C. scambus*, and the cavities are open behind; the middle coxæ are entirely inclosed by the sterna, and the side pieces of the mesothorax are *undivided*;\* the first joint of the abdomen is as long as the two following in *C. dentatus*, but equal to the three following in *C. scambus*.

The differences above noted indicate the necessity of separating *C. scambus* as a distinct genus for which the name *Plectromerus* †*Dej.* may be adopted.

\* This character is otherwise only known to me in the tribe Ancyloerini, also a very anomalous form.

Tribe IV.—**OBRIINI.**

A tribe containing only small species, which are easily distinguished by the front coxæ being more prominent than usual, sometimes nearly conical, and frequently contiguous, but completely inclosed behind. The palpi are usually slender, rarely with the last joint triangular. The other characters are abnormal, the abdomen in the ♀ being deformed in the group *Obria*, and the elytra more or less subulate or abbreviated in *Stenopteri*; the eyes are finely granulated in the latter, variable in the former.

The affinities of this tribe lead from the last groups of *Cerambycini*, towards the tribes with finely granulated eyes, *Lepturini* on the one side, and *Callidiini* on the other.

Group I.—**Obria.**

This group contains a few small species in which the granulation of the eyes has ceased to be of primary importance; but which is easily distinguished by the 1st segment of the abdomen being very long, and the 2d and following irregular, hairy, excavated or deformed in the ♀.

The mandibles are small and acute, the antennæ slender, as long as, or shorter than, the body; the palpi are unequal, and the last joint is rarely dilated. The antennæ are slender, and the 2d joint is larger than in genuine *Cerambycini*. The prothorax is variable in form, always, however, constricted and pedunculated at base, and narrower than the elytra; the front coxæ are conical, prominent, contiguous, cavities small, rounded or angulated, closed behind; middle coxal cavities not open externally. The thighs are strongly clavate, the tibial spurs small or moderate, and the 1st joint of the hind tarsi is as long as the two following.

It is worthy of remark that in *Obrium* the structure of the eyes has merely specific significance; in our *O. rubrum* the eyes are very coarsely granulated, while in the nearly allied European *O. brunneum* the lenses are much smaller.

Our genera may be grouped as follows:—

Palpi with last joint broadly triangular.  
Palpi slightly dilated; tarsi tumid.  
Palpi not dilated, last joint cylindrical;

*CALLINUS.*  
*EUMICHTHUS.*

Eyes coarsely granulated ;	
Prothorax much narrowed behind.	PHYTON.
Prothorax equally narrowed before and behind, tuberculate at the sides.	OBRIUM.
Eyes very finely granulated ; prothorax with dorsal and lateral tubercles ;	
Punctures fine, flying hairs sparse.	HYBODERA.
punctures coarse, flying hairs long, numerous.	
Mesosternum wide.	PILEMA.
Mesosternum narrow.	MEGOBRIUM.

To *Callimus* I would refer *C. chalybeus* Lec., a small highly polished blue species from California, with the elytra sparsely punctured, and the front thighs sometimes yellow.

Phyton contains *Callidium pallidum* Say, from the Atlantic States. Obrium has two species in the Atlantic States.

*Eumichthus cædipus* Lec., is a small species from Vancouver, dark brown, finely punctured and pubescent, with two narrow cinereous elytral bands, between which the color is darker. The first two joints of the tarsi are swollen.

*Hybodera tuberculata*, from California and Vancouver, of brown color, with a large basal patch, and posterior transverse band of pale sericeous pubescence. Besides the sculpture, it differs from *Cartallum* by the prothorax having four discoidal tubercles, and a smaller medial one.

*Pilema* contains two species from California. They resemble very much the European *Cartallum ebulinum*, but apart from the specific differences in color they have the last joint of the palpi quite cylindrical, and the mesosternum very wide.

*Megobrium Edwardsii* Lec. is a Californian species, 12 mm. long, of a testaceous color, with the punctures of the elytra sparse, arranged in rows near the base, obsolete behind the middle.

Lacordaire mentions that the front coxal cavities of *Cartallum* are not at all angulated externally ; I find on repeated examination that they are quite as much so as in the genera with which I have associated it, though the coxal fissure is not as widely open as in the next tribe.

#### Group II.—*Stenopteri*.

A group characterized by the front coxal cavities being widely angulated externally, but entirely closed behind, and the abdomen normal in both sexes. The head is porrect, the front large and oblique, with the labrum prominent, the epistoma not separated ;

the eyes are finely granulated and deeply emarginated; the mandibles are very acute, the mentum rather larger than usual, the palpi short, equal, not dilated. Antennæ punctulate and sericeous, longer than the body in some ♂, shorter in ♀. Front coxæ as above; mesosternum flat, broadly emarginate behind in *Callimoxys*, triangular, and truncate in *Molorchus*; coxæ globose, more prominent than usual, nearly inclosed externally. Abdomen with segments gradually diminishing in length, 5th segment shorter in ♂. Legs rather long, thighs strongly clubbed, hind tarsi with 1st joint twice as long as the 2d; the legs and pronotum are clothed with long flying hairs. The elytra are elongated, and subulate in *Callimoxys*; short, dehiscent, and separately rounded at tip in *Molorchus*. The stridulating surface is large and undivided in *Callimoxys*; very imperfect, oblong, margined each side, slightly elevated in the middle, and nearly destitute of transverse lines in *Molorchus*. The outer lobe of the maxillæ in *Callimoxys* is elongated nearly as in *Rhopalophorus*.

*Heliomanes* and *Glaphyra Newm.*, are not different from *Molorchus*; to *Callimoxys* belong the species heretofore referred to *Stenopterus*; the two genera occur on both sides of the continent, the latter is remarkable for having the hind tibiæ curved inwards, and furnished on the outer side with two rows of acute tubercles, giving a serrate appearance.

Our species of *Callimoxys* differ from (the description of) the European by having the mesosternum broad, and the thighs suddenly and strongly clavate, but these characters are probably not of generic value, and the figure of *C. gracilis* (Duval, Gen. Col. Eur., iv, pl. 45, fig. 210) would do equally well for one of our species. The prothorax varies from red to black, the latter color prevailing in the ♂.

#### Tribe V.—RHOPALOPHORINI.

A single genus *Rhopalophorus* (*Tinopus* Lec.) represents this tribe in the Middle, Western, and Southern States; they are small, slender insects, of blackish-gray plumbeous color, with red prothorax; the head is elongate, the front rather large, oblique, concave, with the epistoma and labrum more prominent than usual; the eyes are finely granulated, and deeply emarginate; genæ long, mandibles very acute; mentum transverse, of usual form, palpi short, equal, not dilated, outer lobe of maxillæ as long

as the palpi. Antennæ slender, with the 4th joint shorter than the 3d and 5th, as long as the body in ♂, shorter in ♀, punctulate and sericeous, without poriferous system. Front coxal cavities small, not angulated, widely open behind; mesosternum somewhat obtusely pointed in front, and feebly concave each side, to complete the front coxal cavities, general surface flat, broad between the coxæ, and emarginate behind, coxal cavities small, closed. Abdomen with the 1st ventral segment longer. Legs very long and slender, thighs suddenly and strongly clubbed at the tip, hind tarsi with the 1st joint twice as long as the 2d. The elytra are flat especially at the base, and suddenly declivous so that the basal edge is unusually distinct; the scutellum is small, but obtuse, the stridulating surface is large and undivided.

This group has been considered as allied to *Callichroma*, but seems to me better placed as an ally of *Stenopterus*, etc., leading to *Necydalis*, and thence to *Leptura*.

#### Tribe VI.—**ANCYLOCERINI.**

Body slender, cylindrical, coarsely punctured; head short, front small, perpendicular, genæ large; eyes finely granulated, deeply emarginated, vertex concave; mandibles acute, palpi short, nearly equal, not dilated; mentum very transverse, excavated, as in most *Cerambycidae*. Antennæ serrate, half as long as the body in ♀, longer than the body in ♂, very sparsely punctured, sensitive system commencing on the 3d joint, forming two well-defined spaces on the under surface, separated by the sharp edge of the joint, 11th joint oval, pointed at tip in ♀, very short and curved in ♂.

Front coxal cavities small, open behind; middle coxal cavities nearly closed by the sterna; mesosternum deeply emarginate behind. Legs slender, thighs suddenly and strongly clubbed, hind pair armed with a terminal spine on the inner side; 1st joint of hind tarsi scarcely one-half longer than the 2d. Ventral segments nearly equal in length except the 1st, which is longer.

A very peculiar tribe, recalling *Ibidion* by its slender, cylindrical form, but not related to it nor to any other known to me.

But one species *Ancylocera rugicollis*, black with scarlet elytra and abdomen, is found in our Southern States from North Carolina to Texas.



## Tribe VII.—PARISTEMIINI.

I have adopted the name of this tribe from Lacordaire; it has two representatives in our fauna; *Pteroplatus? floridanus* Lec., a black coarsely punctured species, with two narrow orange vittæ on the prothorax, and the base and outer margin of the elytra also orange; and *Holopleura* n. g., found in California.

The head is moderate, mandibles small, acute, curved; the eyes large, very deeply emarginate, not very finely granulated, and embracing the base of the antennæ rather less than usual, the upper lobe is larger than usual; the front is rather flat, with the transverse suture very deep; the palpi short, with the last joint cylindrical, truncate at tip; the mentum is trapezoidal, and more porrect than in neighboring groups, being almost as in *Callidium*; the antennæ (♀) are a little more than half as long as the body, stout, serrate, and velvety; the 1st joint is as long as the 3d, but stouter, the 2d is one-third the size of the 3d, the 4th shorter than the 5th, which is the longest, the following diminish in length. The prothorax is rounded on the sides, truncate in front, bisinuate at base; scutellum variable in form; elytra a little wider from the base, rounded at tip, with the suture, margin, and three discoidal costæ elevated, the intermediate costa being the longest; epipleuræ well marked, extending to the tip. Prosternum narrow between the coxæ, which are rounded, with the cavities open behind, and feebly angulated externally; mesosternum flat, triangular, coxal cavities widely open externally; epimera of metathorax moderately wide, parallel. Ventral segments nearly equal. Legs short, slender, thighs not clavate, tibial spurs very small, 1st joint of hind tarsi as long as the two following.

I cannot see the stridulating organ in the specimens before me. On each side of the pronotum there is an elliptical depressed space, tolerably well defined by an acute edge, which is perhaps sexual.

This like the following tribe is a transition form; the 2d joint of the antennæ is too large for the series in which I have placed it, but, on the other hand, the front coxæ are not transverse as in the *Callidioides*. It seems to lead off from the latter towards the *Stenaspes*; it is easily recognized by the peculiar sculpture,

and the costate elytra, with epipleuræ prolonged to the tip, a character I have seen in no other tribe.

Antennæ short, serrate, 11th joint appendiculate.

PTEROPLATUS?

Antennæ longer, slender, 11th joint simple.

HOLOPLEURA.

Group I.—*Rosalini*.

A very distinct tribe, represented by *Rosalia funebris*, in Oregon and Vancouver, a large, elongate, velvety black insect, with bands and antennal rings of cinereous. The head is moderate, front not elongated, obliquely declivous, antennal tubercles not elevated, genæ long; eyes finely granulated, very deeply emarginated, upper lobe rather broad; antennæ long, outer joints sericeous, densely pubescent, joints 3-7 with a tuft of longer hair at the apex, last joint feebly divided in ♂. Mandibles stout, acute, with a small tooth near the base; mentum narrowed in front, entirely corneous; palpi nearly equal, truncate at tip. Prothorax constricted at base and apex, with an acute lateral spine each side, and two acute dorsal tubercles; prosternum rather broad, coxal cavities strongly angulated, widely open behind; mesosternum broad, truncate behind, declivous in front; epimera very large, extending to the coxal cavities; metasternum not acutely emarginate behind, episterna rather wide, narrowed behind, and nearly pointed; intercoxal process of 1st ventral broadly rounded in front, segments nearly equal in length, 5th truncate at tip, with an acute, short, medial cleft in ♀; shorter, triangularly impressed, and hairy in ♂; the last dorsal in ♂ is deeply emarginate, and in ♀ rounded and subtruncate; the 6th ventral and corresponding interior dorsal segment is prominent and truncate in ♀. Legs slender, moderately long, thighs not clavate, tibial spurs small, 1st joint of hind tarsi as long as the two following united.

The affinities of this tribe are somewhat doubtful; the scutellum is rounded behind; the mesonotum is smooth, with a broad medial vitta of stridulating surface, and a small lateral space is punctured and pubescent. The form of the front coxæ is very much as in *Callidium*, near which it is placed by Schiödt, but the long and tufted antennæ, with the 2d joint very small, and the tuberculate prothorax and slender legs prevent such an association. The eyes embrace the base of the antennæ rather less than in the neighboring tribes.

Tribe VIII.—**CALLICHROMINI.**

With this tribe commences a series distinguished by the scutellum being acute at tip, and the antennæ carinate on the lower edge, with the poriferous system arranged in a groove each side of the carina. The eyes are always very finely granulated, and deeply emarginated, embracing the base of the antennæ, with the upper lobe tolerably wide.

This tribe is further distinguished by the mandibles being long, pyramidal, nearly straight, bent only at the tip, which is acute. The outer lobe of the maxillæ is longer than the palpi, which are cylindrical; the labial palpi are much longer, feebly dilated, truncate at tip; the mentum is flat, trapezoidal, and porrect, gradually becoming coriaceous in front; the base of the maxillæ is very large and flat; the gular process for support of the mentum is nearly wanting; the genæ are long. The prothorax is constricted before and behind, armed with a strong lateral spine. Scutellum moderately large, triangular acute, mesonotum smooth, with a narrow triangular stridulating surface; elytra narrowed from the humeri, which are prominent, rounded at tip. Prosternum not tuberculate, rounded behind, coxæ globose, cavities not angulated externally, completely closed behind; mesosternum parallel, emarginate behind, coxal cavities rounded, scarcely angulated, closed by the epimera, which extend inwards further than usual; metathoracic episterna wider in front, with very distinct posterior scent pores; hind coxæ rather prominent. Ventral segments, the 1st longer, the others equal, tapering considerably; the 5th in ♀ longer than wide, subtruncate; in ♂ deeply and broadly emarginate, with the 6th joint filling the space, and rounded behind. Legs slender, hind pair elongated, tibiæ compressed, feebly carinated, spurs usually not large, 1st joint of hind tarsi nearly as long as the others united.

The last joint of the antennæ is simple in both sexes, but is much longer in the ♂.

Four species of *Callichroma* are found in the warmer parts of the country; they exhale an agreeable musky odor, and, with one exception, are of a beautiful blue or green color.

Tribe IX.—**TRACHYDERINI.**

A very large tribe as here defined, and containing as great a variety of forms as the Cerambycini, from which it is distinguished

by the acutely triangular scutellum, and finely granulated eyes. The last joint of the palpi never has the triangular form which it affects in most Cerambycini, but is usually oval, squarely truncate at tip, with a deep elliptical impression on the side.\* The tibiae are not carinate, and the tibial spurs are rather long.

The following groups may be recognized in our fauna:—

Mandibles acute, or simple at tip;

Pronotum broadly lobed at base; poriferous system of antennae very distinct;

Metasternal pores absent, side pieces very wide.

MEGADERI

Metasternal pores distinct.

TRACHYDERES.

Pronotum not lobed, sometimes subsinuate at base, poriferous system often obsolete, and palpi in some genera scarcely impressed.

STENASPER.

Mandibles emarginate at tip.

TYLOSES.

#### Group I.—Megaderi.

This group contains but one genus *Megaderus*, of which one species, *M. bifasciatus* Dupont (*corallifer* Newm.), extends from Mexico into Texas. It is a broad, flat insect, with roughly punctured prothorax, angulated on the sides behind the middle; elytra finely punctured, with a basal and medial transverse band, which are more or less confluent, separate, or even obliterated.

The antennae are shorter than the body, with the 1st joint as long as the 3d, and a little thicker; 3d and following with poriferous spaces; outer joints velvety, 11th appendiculate, acute at tip; front rather flat, oblique; genae long; mandibles stout, acute, palpi short, last joint not elongated, oval truncate, deeply impressed. Prothorax broad, strongly and broadly lobed at the base, deeply excavated behind the middle, especially at the sides, which are angulated; scutellum very large, acutely triangular, mesonotum sparsely punctured, with narrow medial stridulating surface; elytra finely densely punctured, rounded behind, sutural angle not rounded, nor prominent. Pro- and mesosternum very broad, the former overlapping the latter, both broadly emarginate, behind; side pieces of metathorax very wide, epimera extending

\* Among the Cerambycini with coarsely granulated eyes I have observed this form of palpi and the lateral fovea in *Chion*, which is an annectant form; and the same in a much less degree in some other genera. The maxillary palpi are never short as in *Callichromini*, nor has the ♂ an additional ventral segment. The front coxal cavities are open behind, and not angulated externally.

beyond the hind coxæ, which are widely separated; no scent pores. First ventral segment much longer; 5th longer than the 4th, broadly subtruncate at tip. Legs slender, tibial spurs long, tarsi broad, 1st joint of hind pair scarcely longer than the 2d.

An anomalous group, having an evident affinity towards *Cylene* of the tribe *Clytini*.

#### Group II.—*Trachyderes*.

Insects of large size, and glabrous surface, having the antennæ compressed, much longer than the body in ♂, with very distinct poriferous system, 11th joint either simple or appendiculate; the mandibles of *Dendrobias* ♂ are very long, and have an acute tooth near the tip, so as to appear emarginate, without really being so. The palpi have the last joint cylindrical, and deeply foveate. The scutellum is very large, acutely triangular; mesonotum with narrow stridulating plate. Elytra convex, narrowed from the base, rounded at tip. Prothorax variable in form, tuberculate on the disk, and strongly armed on the sides in *Dendrobias*, uniformly convex in *Lissonotus*; prosternum perpendicularly declivous in both, armed also with a large tubercle in front of the coxæ in *Dendrobias*; mesosternum elevated, perpendicular in front; side pieces of metasternum tolerably wide, narrower behind, with scent pores in *Dendrobias*, without them in *Lissonotus*; ventral segments, 1st longer, others nearly equal. Legs rather stout, thighs moderately clubbed, tibial spurs moderate, tarsi broad, 1st joint of hind pair scarcely longer than 2d.

The two genera are found only in the most southern part of Texas, Arizona, and Lower California, and constitute two subgroups corresponding to *Trachyderides*, and *Lissonotides* of *Lacordaire*.

#### Group III.—*Stenaspes*.

I have removed from the *Stenaspides* of *Lacordaire* those genera in which the mandibles are chisel-shaped, and emarginate at the tip; and although he mentions\* that in some instances this character is merely specific or sexual, I cannot avoid believing that this is only the case in genera, like *Sphænothecus*, composed of heterogeneous material. However this may prove on

\* Gen. Col. ix, 167, note 1.

more extended observation, the group as here defined contains all those genera in our fauna in which the eyes are finely granulated, deeply emarginate, with the upper lobe wide; the scutellum acute, but not very large, though sometimes elongate; and the prothorax not distinctly lobed, but only feebly bisinuate or truncate at base. The antennæ are more slender than in *Trachyderes*, and the poriferous system is much less distinct, or even obsolete, though in *Stenaspis* it is still quite obvious, and the joints are carinate and bisulcate. In *Batyle* the last joint of the palpi (which is subcylindrical, and truncate) is very feebly impressed.

The antennal tubercles are either much elevated, leaving a concavity between them, or scarcely elevated, in which case the vertex is nearly flat; the front in the former is very large, square, and perpendicular, and the genæ are long; in the latter the tubercles are less elevated, the front is moderate, declivous, and the genæ usually short.

They may be thus tabulated:—

- A. Front large, square, perpendicular, abruptly separated from the antocular spaces;  
 Prothorax bituberculate at the sides, body glabrous;  
     Mesosternum protuberant. STENASPIS.  
 Prothorax armed with a lateral spine; mesosternum not protuberant;  
     Body pubescent. TRAGIDION.  
     Body glabrous. PURPURICENUS.  
     Prothorax rounded, convex. ANTHECERUS.
- B. Front moderate, short, declivous, not abruptly defined each side;  
 Two ivory vittæ on each elytron;  
 Mesosternum declivous; (prothorax margined at apex).  
MANNOPHORUS.
- One ivory vitta on each elytron;  
 Mesosternum protuberant; (prothorax not margined at apex).  
ENTOMOSTERNA.
- Elytra without ivory vittæ; mesosternum declivous;  
     Body pubescent, prothorax not margined at apex. AMANNUS.  
     Body pilose, prothorax margined at apex. BATYLE.

Of the three species of *Tragidion*, two have the elytra sulcate, while *T. armatum* has them even: there is also a difference in the hind tarsi, which are comparatively wider in *T. annulatum*. Variations in the proportions of the joints of the hind tarsi are not unusual in *Cerambycidae*, as, for instance, in *Criocephalus*. This fact has induced me to refer *Sphænothecus cyanicollis* to

Entomosterna, instead of forming of it the new genus indicated but not named by Lacordaire.\*

Of the genera tabulated above *Stenaspis* and *Tragidion* occur from the Atlantic to the Pacific in the warmer regions, the former extending northward in the central region, the latter in the Atlantic district. *Purpuricenus* occurs in the Middle and Western States. The next three genera are found in Texas, and *Batyle* occurs in the Atlantic region especially southward.

The genus last named is placed by Lacordaire in *Heteropsides*, of which he observes that the middle coxal cavities are closed externally; I find, however, in my specimens that the mesothoracic epimera attain the coxal cavities, and that they are as open as in *Purpuricenus*. The character as used by Lacordaire seems to me very deceptive, and without value for systematic results.

Group IV.—*Tyloses*.

Closely related to the preceding, and only differing in fact by the mandibles not being acute at tip, but truncate, forming a chisel-shaped edge, which is emarginate. The front is moderate in size, nearly perpendicular, and the antennal tubercles are not much elevated; the genæ are not elongated. The scutellum is small, acutely triangular, and the stridulating plate of the mesonotum is large. The side pieces of the metasternum are tolerably wide, not narrowed behind, and the scent pores are distinct, except in *Perarthrus villatus* and *Sphænothecus bivittatus*. The legs are slender, thighs not clavate, tibial spurs rather long, hind tarsi with the 1st joint equal to the two following; less slender in *Tylosis* and *Crossidius* than in the other genera. The antennæ are slender, with elongate sensitive spaces near the carina of the under margin. The last joint of the palpi is subcylindrical, and impressed, as usual, in the other groups of this tribe.

Our genera, which are found mostly in Texas, Arizona, and Lower California (*Crossidius* alone extending into Colorado, California, and Oregon), may be tabulated thus:—

A. Elytra without ivory vittæ;	
Prothorax with an acute lateral spine;	
Eyes not divided (pubescence fine).	OXOPHUS.
Eyes divided (pubescence coarse).	SCHIRAX.

\* Gen. Col. ix, 184, note 3.

- Prothorax rounded on the sides, with dorsal callosities. TYLOSIS.  
 Prothorax rounded on the sides, or feeble spinose, without dorsal callosities (pubescence long and partly erect). CROSSIDIUS.  
 Prothorax narrowed in front, mesosternum protuberant. SPHÆNOTHECUS.  
 B. Rach elytron with two ivory vittæ; prothorax narrowed in front; Mesosternum declivous, body robust. PERANTHERUS.  
 Mesosternum protuberant, body slender. ISCHNOCNEMIS

Schizax is established on a remarkable insect, *S. senex* Lec., from Arizona; the color is black, the pubescence is coarse, dirty white, with the scutellum, suture and side margin of elytra densely clothed with yellow pubescence; the elytra rounded at tip, with the suture slightly prominent; the antennæ are slender, and very long in the ♂.

To Crossidius belongs *Callidium discoideum* Say, which is identical with *Cr. pulchrior* Bland. The reference of Say's species to *Eriphus* (now *Batyle*) was incorrect, and was owing to my not having properly identified the insect.

To Sphænothecus I would refer *S. suturalis* Lec., from New Mexico, while the Mexican and Texan *S. bivittatus* Dupont, having distinct ivory vittæ seems to belong more properly to *Ischnocnemis* Thomson.

#### Tribe X.—STENOSPHEININI.

Closely allied to the Cyllene group of Clytini, but the punctures are sparse and coarse, the pubescence scanty, and the general form more slender. The head is small, narrow and porrected in two of the species, with the front elongated, and very slightly declivous; but shorter and nearly vertical in *Stenosphenus notatus*. The eyes are finely granulated, deeply emarginated; the antennal tubercles are not elevated; antennæ as long as the body in ♀, somewhat longer in ♂, setaceous, punctured and pubescent, not sericeous, sparsely clothed beneath with flying hairs; 2d joint small, 3d longer than 4th, 3-7 armed with an apical spine on the inner side, as in *Elaphidion*. Palpi short, subequal, last joint nearly cylindrical, truncate at tip, not impressed. Prothorax rounded on the sides, without spines or callosities. Scutellum rounded behind, mesonotum covered with fine stridulating surface, with a few punctures each side near the edge. Elytra truncate at tip, and armed with two apical spines as in most species of *Elaphidion*.

Front coxal cavities rounded, open, prosternum suddenly de-



clivous, and perpendicular behind; middle coxæ inclosed by the sternal pieces, not angulated externally; mesosternum rather broad, protuberant, suddenly declivous in front, truncate or broadly emarginate behind, side pieces moderately large, intervening between the sterna, but not extending to the coxæ. Metasternum acutely emarginate behind for the reception of the intercoxal process, episterna linear, ventral segments gradually decreasing in length.

Legs rather short, thighs not clavate, not spinose at tip; tibiæ strongly carinated, with the 1st joint as long as the two following united.

The closest affinities of this genus in the series with finely granulated eyes are evidently with *Cyllene*, but there is an equally evident cross affinity in the direction of *Elaphidion*, *Sphæron*, etc.

*Batyle*, associated with *Stenosphenus* by Lacordaire, has the scutellum acutely pointed, the hind legs elongated, the antennal tubercles more elevated, and the eyes more prominent. It seems to me a degraded ally of *Purpuricenus*, and I have placed it accordingly.

#### Tribe XI.—CLYTINI.

A tribe containing many species, but on account of the variation in appearance and characters very difficult to define. The head is sometimes rather small, sometimes large, the front long, quadrate, and vertical in some, short and oblique in others, eyes finely granulated, deeply emarginate, with the lower lobe always large; antennæ with the outer joints sericeous, usually shorter than the body in both sexes, sometimes longer in the ♂, joints 3-7 in some genera (*Cyrtophorus*) armed with an apical spine; palpi short, equal, dilated, but not very broadly, last joint impressed; mandibles short, stout, acute; mentum nearly semicircular, corneous. Front coxal cavities rounded, open behind, not angulated externally; middle cavities usually open, sometimes (*Eudercus*, etc.) closed externally, side pieces large, articulating with the metasternum, so as to interpose between the meso- and metasternum; the latter with the side pieces usually wide, sometimes narrow. Legs long, thighs sometimes slender, sometimes clubbed, spines of hind tibiæ usually well developed, tibiæ not carinated, hind tarsi with first joint usually very elongate. Ventral segments diminishing gradually in length.

The scutellum is obtusely triangular in some species of *Cyllene*, rounded in the other genera; the mesonotum is punctured, and hairy at the sides, and has a large undivided, very finely striate stridulating surface.

The genera are numerous, and indicate three groups; the affinities are in various directions, to *Megaderus*, *Callidium*, and by a gradual transition in *Eudermes*, etc., towards certain *Lamiides*. Nearly all the species of this group are varied with bands of yellow, white, and black pubescence, and the sculpture is always of fine punctures; in some species small elevations on the prothorax are intermixed with the punctures.

Groups may be defined as follows:—

Epimera of metathorax produced over the angles of the 1st ventral segment, so as to inclose the hind coxae externally; episterna of metathorax usually wide;

Front short, intercoxal process rounded.

CYLLENES.

Front large, intercoxal process acute.

CLYTI.

Epimera of metathorax not produced, episterna linear; front large; intercoxal process of abdomen acute.

ANAGLYPTI.

#### Group I.—*Cyllenes*.

The head is comparatively small, the front short and oblique, the antennæ in *Cyllene* better developed than in the other genera, and longer than the body in ♂, nearly as long in ♀; in some of the species of that genus they are thicker at the base, as in many *Callidia*. The body is rather stouter and less convex than in the other groups; the prosternum is sometimes very broad, and the mesosternum gibbous, or perpendicularly declivous in front; the episterna of the metathorax are wide, and the epimera prolonged over the side angles of the 1st ventral segment, the intercoxal process of which is rounded in front. The legs are moderate, and not very unequal in length, scarcely clubbed, not spinose at tip. The affinities are partly with *Megaderus*, and partly with *Callidium*; the scutellum is usually rounded behind, but is quite distinctly triangular in some species of *Cyllene*.

The genera may be tabulated as follows:—

Pronotum transversely excavated at the sides, near the base, prosternum perpendicular at tip, mesosternum usually perpendicular in front.

CYLLENES.

Mesosternum oblique or nearly flat, prosternum declivous at tip, not perpendicular, pronotum not excavated at the sides, but only rounded, and constricted at base;

Antennæ compressed, subserrate.

GLYCIBIUS.

Antennæ filiform;

Mesosternum declivous.

CALLOIDES.

Mesosternum nearly flat, episterna narrower.

ARHOPALUS.

*Glycibius* Lec. is founded upon *C. speciosus* Say, a large black and yellow species which infests the sugar maple.

*Calloides* Lec. contains *C. nobilis* Harris, a large species of the Atlantic States, and the nearly allied *C. Lorquini* Buquet, of California. *Arhopalus* Serv. (*Sarosesithes* Thomson) contains only *C. fulminans* Fabr.

#### Group II.—Clyti.

The head is larger than in the Cyllenens, and the front much longer, sometimes perpendicular, and quadrate; the antennæ are always short, not very different in the sexes, filiform, or slightly thickened externally; the episterna of the metathorax are usually wide, and the epimera are produced over the angles of the 1st ventral segment, the intercoxal process of which is acute. The thighs are usually clavate, the hind pair frequently very long, and occasionally spinose at tip; the first joint of the hind tarsi usually very long.

Front rounded, declivous, thighs not spinose at tip, episterna of metathorax wide;

Head not carinated.

CLYTUS.

Head carinated.

XYLOTRECHUS.

Front quadrate perpendicular; head not carinated;

Episterna of metathorax wide.

NEOCLYTUS.

Episterna of metathorax narrow.

CLYTANTHUS.

*Clytus* is represented by *C. marginicollis* Lap. in the Atlantic States, and *C. lanifer* Lec. in Arizona.

*Clytanthus* by *C. ruricola* Oliv. and *albofasciatus* Lap. in the Atlantic States.

The other two genera are distributed over our whole territory, and contain many species.

#### Group III.—Anaglypti.

The head is also large, and the front long, and quadrate; the antennæ slender, moderately long, with the joints 3-5 sometimes spinose at tip; the prothorax is not narrowed in front, but always much constricted behind; the elytra are frequently gibbous at the base, and declivous at tip, and sometimes have transverse

ivory bands. The episterna of the metathorax are narrow, and the epimera are scarcely produced over the angles of the 1st ventral; the intercoxal process is acute. The legs are moderate in length, and the thighs somewhat strongly clubbed, and not spinose at tip; the 1st joint of the hind tarsi is less elongated than in the other groups. The mesonotum is not punctured at the sides, and is covered with very fine stridulating lines.

In some of the genera the middle coxal cavities are nearly or entirely closed externally, but as in other portions of the series, the transition is accomplished by such slight gradations that the character seems to have little value.

2d joint of antennæ equal to 4th;

Antennæ not spinose, elytra without ivory spots.

MICROCLYTUS.

2d joint of antennæ short, 3d longer than 4th;

Elytra without ivory spots;

Eyes oblique, emarginate.

CYRTOPHORUS.

Eyes entire, rounded.

TILLOMORPHA.

Elytra with a transverse ivory band.

EUDERCES.

*Microclytus* is founded upon *C. gazellula* Hald. a species of the Middle States, having entirely the form and coloration of the European *Anaglyptus mysticus*, but smaller, and differing essentially by the 2d joint of the antennæ being fully half as long as the 3d, and scarcely shorter than the 4th joint; the flying hairs are peculiarly long and numerous; the eyes are oblique, emarginate above, and pointed behind, as if the usual deeply emarginated form had been shortened by the obliteration of the upper part. The same form is seen in *Cyrtophorus verrucosus*, but less acute at the upper angle. In *Tillomorpha geminata* (Hald.) the eyes are oval, not at all emarginate, the upper part being absent; and in *Eudercus* they are entirely divided, the lower part being emarginate, acutely pointed above, and the upper part small, distant, and oval.\*

\* Lacordaire, Gen. Col. ix, 89, observes that this character, mentioned by me in the original description of the genus, has completely escaped him; it is quite obvious in all the specimens before me, though in *Eu. picipes* the two parts of the eye are connected, as in *Tetropium*, by a line of corneous material, without lenses; even this line is wanting in *Eu. pini*, so that the eye becomes as completely divided as in *Tetraopes*.

## Tribe XII.—AGALLISSINI.

A tribe composed of a single genus *Agallissus* *Dalman* (*Cryptopleura* *Lec.*) which is remarkable for having the epipleuræ strongly sinuated near the humeri. Head small, front short, vertical in *A. clerinus*, quadrate, oblique in *A. gratus*; eyes finely granulated, deeply emarginate; antennal tubercles not elevated, antennæ slender, shorter than the body in both sexes, finely punctulate, and sericeous, 11th joint feebly appendiculate; mandibles small, stout, acute, genæ moderately short; mentum transverse, of the usual form, entirely corneous; palpi short, equal, not dilated. Front coxæ small, not prominent, cavities rounded, open behind; middle coxal cavities angulated externally, mesosternum suddenly declivous in front. Epimera of metathorax very wide in front, gradually narrowed behind; ventral segments slightly decreasing in length; legs short, slender, thighs not clavate, spurs small, 1st joint of hind tarsi but little longer than the 2d.

The prothorax is rounded on the sides, not transverse, the elytra are wider at base than the widest part of the prothorax, and the humeri are rather prominent, as in many Lepturidæ. The scutellum is obtusely rounded behind, the mesonotum is smooth and polished, with a large, very fine stridulating plate. Flying hairs of moderate length are seen over the general surface of the body, and on the legs.

Two species occur in our fauna, *A. gratus* (*Cryptopleura grata* *Hald.*) from Texas, and Northern Mexico, shining black, sparsely punctured, with the elytra narrowed behind, truncate and finely serrate at tip, ornamented with yellow spots, of which the basal pair are elongate; and *A. clerinus* from Florida, opaque black, very coarsely and densely punctured; prothorax red, with faintly indicated dorsal smooth spots; elytra parallel on the sides, rounded at tip, with a round basal spot, and two broad transverse bands bright scarlet. Length 13 mm.

I consider this as the nearest approach made by the genuine Cerambycidæ to the *Stenocorus* group of Lepturidæ. It is, however, quite an isolated form, and the two species above mentioned should probably be regarded as distinct genera.

Tribe XIII.—**ATIMIINI.**

One genus with two species constitutes this group, which has lost entirely the characteristic form of the Cerambycidae, and resembles a rather stout Lamiide. The head is broad and short, the front perpendicular; the eyes large, deeply emarginate, almost in fact divided, and not very finely granulated; labrum transverse, ciliated with very long hairs; mandibles slender and acute; mentum trapezoidal, corneous; palpi unequal, scarcely compressed, truncate at tip, the maxillary about half longer than the labial. Antennae slender, shorter than the body in both sexes, 11-jointed; 2d joint less than half as long as the 3d, which is a little shorter than the 4th, punctured and pubescent, not sericeous. Front coxae rounded, somewhat large, widely separated by the prosternum, cavities not angulated externally, *completely closed* behind; middle coxae widely separated by the mesosternum, which is truncate behind and gradually declivous in front; coxal cavities slightly angulated externally, completely closed by the sterna; metathoracic episterna moderate, neither wide nor narrow; metasternum unusually deeply emarginate behind, for the reception of the acute intercoxal process; ventral segments slightly decreasing in length, the 5th in ♀ a little longer than the 4th and truncate. Legs short, thighs moderately clavate, tibiae with small spurs, hind tarsi with 1st joint equal to two following united.

The scutellum is subquadrate, rounded behind; the mesonotum has a large stridulating surface, divided by a dorsal furrow, as in *Leptura* and allied genera.

The body is densely clothed with long, coarse, luteous hair, with some denuded spots on the thorax and elytra; the former is quadrate, transverse, scarcely rounded on the sides, and coarsely punctured, the latter a little broader, truncate at tip, more finely and very sparsely punctured, with several rows of very distant larger punctures. The front tibiae are without any vestige of the oblique groove seen in *Lamiæ*.

*Atimia confusa* (Clytus conf. Say) occurs in the Middle States and Canada; and *A. dorsalis* Lec. on the Pacific slope.

Tribe XIV.—**DISTENINI.**

This tribe, represented only by *Distenia undata* in our fauna, exhibits so many peculiarities that it may well be viewed as a survivor of the synthetic types of former times. The combination of the form of eyes of Prionidæ, with the ligula of the same sub-family, large globose front coxæ (as in Achryson), long, slender antennæ; spinose prothorax and elytra (as in many Cerambycoides), a divided stridulating organ (as in Lepturoides), with a peculiar form of mandibles, not known to me otherwise in the whole family, is very remarkable. The form of body and general appearance is intermediate between a slender Cerambycoid and a Lepturoid. Lacordaire has very properly given to this type, as the 3d division of the true Cerambycidæ, the greatest prominence it could have in his system.

Body elongate, head large, horizontal; eyes transverse, large, rather coarsely granulated, feebly emarginate, not embracing the base of the antennæ; neck moderately constricted; front very short, suddenly declivous between the antennæ, epistoma large, quadrate, horizontal, labrum large, broader than long. Antennæ long, setaceous, 1st joint as long as the head, comparatively slender, 2d joint small, but with its condyle very much protruding from the 1st joint; following joints equal in length, pubescent, not sericeous, without distinct sensitive spaces, fringed beneath with long, fine, close lying hairs, which extend far beyond the end of each joint, from the 4th to the 10th. Palpi very unequal, maxillary with the last joint elongate triangular, rounded at tip, not impressed, labial shorter, last joint thick, rounded triangular. Ligula large, corneous, feebly emarginate in front, supports of palpi small, widely distant. Mandibles thick, curved, chisel-shaped at tip, apical edge vertical, sharp, straight. Prothorax with dorsal elevations, and acute lateral spine, constricted near apex and base, which are truncate. Scutellum rounded behind, mesonotum with large stridulating plate, divided by a smooth dorsal stripe. Elytra wider in front, gradually narrowed from the humeral angles, bispinose at tip. Prosternum very narrow between the coxæ, which are very large, globose, and prominent, cavities widely open behind, not at all angulated externally. Mesosternum rather wide, parallel, emarginate behind, coxal cavities narrowly angulated externally, but closed by

the contact of the sternal pieces. Episterna of metathorax long and narrow, nearly pointed behind; scent pores not very distinct, though the insect has an offensive odor when alive. Hind coxæ rather convex, though distinctly separated. Ventral segments nearly equal in length, 5th in ♂ semicircularly emarginate at tip. Legs slender, hind pair longer, middle tibiæ with a singular oblique groove on the outer face, below the middle; tibial spurs distinct; 1st joint of hind tarsi as long as the two following.

#### Tribe XV.—DESMOCERINI.

This tribe is represented by two species of *Desmocerus*, *D. palliatus* in the Atlantic, and *D. auripennis* in the Pacific States. Though by the large conical and contiguous front coxæ, and the divided stridulating surface of the mesonotum it belongs to the Lepturoid series, it differs remarkably from the other genera by the much smaller and stouter mandibles, which are not at all fringed on the inner margin. The ligula is large, membranous, and bilobed, though less deeply so than in Lepturini; the palpi are short, not dilated; the mentum is large, trapezoidal, and the gular process very short. The eyes are finely granulated, nearly rounded, suddenly and deeply emarginate towards the base of the antennæ, which are 11-jointed, with the joints 3-5 thickened at the end, and the outer ones velvety black; the vertex is prominent, deeply sulcate, suddenly perpendicular in front of the antennæ, front horizontal, advancing as in other Lepturoides (and also in *Distenia*) between the base of the mandibles; labrum large, not emarginate. Prothorax gradually wider behind, obtusely angulated on the sides, hind angles prolonged, acute; scutellum rounded behind, stridulating plate of mesonotum large, divided by a smooth furrow. Elytra parallel, coarsely punctured, obliquely rounded behind. Prosternum very narrow between the coxæ, which are large and conical with the cavities angulated externally and open behind; mesosternum narrow, subemarginate at tip, coxal cavities widely open externally; episterna of metathorax wide, subparallel, suddenly narrowed behind. Hind coxæ prominent, contiguous at the inner side; ventral segments subequal; legs slender, tibial spurs moderate, tarsi rather broad, hind pair with 1st joint scarcely equal to the two following united.

In the ♂ the 5th ventral segment is slightly emarginate at tip,



and the antennæ are stouter. The insects are found on species of *Sambucus*.

Tribe XVI.—**NECYDALINI.**

Head large, suddenly, but not very deeply constricted far behind the eyes, which are finely granulated, large, oblique, deeply emarginate; the front is very large, quadrate, and vertical, the genæ long, and the hypostoma limited each side by an oblique ridge; the antennæ are inserted high up on the top of the front between the eyes; the mandibles are small, stout, pointed, and fringed with hair on the inner margin; the palpi are very short, the last joint oval and deeply impressed in *Ulochætes*, bell-shaped and feebly impressed in *Necydalis*. Antennæ filiform, longer in ♂; 2d joint small; 3d and 4th united not longer than the 5th in *Ulochætes*; 3d and following joints equal in *Necydalis*. Prothorax deeply constricted before and behind, and tuberculate on the sides. Scutellum elongate, triangular; stridulating plate of mesonotum large, undivided. Elytra very short, dehiscent, separately rounded at tip; dorsal segments exposed, entirely corneous; wings not folded at tip, but lying straight along the abdomen. Prosternum very short in front of the coxæ, narrow between them, coxæ large, conical, prominent, nearly contiguous, cavities angulated externally, closed behind; mesosternum subtriangular, truncate behind; coxæ prominent, cavities open externally; metathoracic episterna wide in front, narrowed behind; hind coxæ prominent, nearly contiguous. Abdomen gradually narrowed behind and nearly pointed in ♀, slightly thicker at the extremity in ♂; ventral segments equal in length, 5th in ♂ broadly emarginate. Legs slender, hind pair much longer, tibial spurs small, tarsi narrow, 1st joint elongate, not brush-like beneath, in front pair equal to 2d and 3d united, in middle pair equal to all the others united, in the hind pair much longer.

This tribe is represented in our fauna by *Necydalis mellitus* Say in the Atlantic, two species of the same genus, and *Ulochætes leoninus* in the Pacific States. The latter is a large, robust, and very hairy insect, which is well figured in the Pacific R.R. Explorations, vol. xi, pl. 2, f. 12.

The undivided stridulating plate is an exception in the Lepturoid series, to which I have attached this remarkable tribe, and with which it has very strong relations. It would perhaps be

better to view it as representing a separate series, in which might be placed various foreign tribes in which the wings are not folded at the end. In this connection, it is important to observe that in *Stenopterus* and *Molorchus*, which have abbreviated elytra the wings are not straight, but folded in the usual manner.

Although the under surface of the head is limited each side by a line, as in other *Lepturoides*, the line is less defined and the mentigerous process is not more developed than in *Cerambycoides*, and the mentum has the short transverse form so frequent in that series, and totally unlike the ordinary *Leptura* type.

Prof. Lacordaire describes the front coxal cavities as open behind, but they are very evidently closed in *N. mellitus*.

#### Tribe XVII.—ENCYCLOPINI.

The head is quadrate, suddenly but not strongly narrowed and constricted far behind the eyes (so that the neck is very short); front large, quadrate, nearly vertical, eyes finely granulated, obliquely emarginate, with the antennæ inserted high up on the front near the emargination; antennæ 11-jointed slender, with 4½ joints punctured, the rest sericeous, genæ rather long; mandibles small, acute, fringed with hair on the inner margin; labrum rather large; palpi moderate, unequal, last joint rounded triangular; hypostoma very distinctly defined each side, mentigerous process short, broad, distinct, mentum large, trapezoidal; prothorax constricted before and behind, wider at the base, tuberculate on the sides. Scutellum small triangular, mesonotum in *Encyclops* punctured and hairy, with a very narrow median smooth space, which is carinated, but does not appear to be stridulating; in *Leptalia* the stridulating surface is large, and divided by a fine dorsal groove; in *Pyrotrichus* not examined. Elytra elongate, parallel, separately rounded in *Encyclops*, feebly truncate in *Pyrotrichus*. Front coxæ conical prominent, nearly contiguous, cavities angulated, open behind; mesosternum triangular, coxal cavities open externally; metathoracic episterna narrow, pointed behind; hind coxæ not prominent; ventral segments nearly equal, the 1st a little longer, the 5th a little shorter. Legs slender, hind pair longer, tibial spurs small; tarsi in *Encyclops* slender elongated, 1st joint of all much longer, and on the hind tarsi without brush of hair beneath; in *Leptalia* the first joint of hind tarsi is sulcate, with a line of

pubescence each side ; in *Pyrotrichus* wider, with usual covering beneath, and only as long as the 2d and 3d united.

The eyes are very deeply emarginate in *Pyrotrichus*, rounded, with a small but distinct emargination in *Encyclops*, feebly emarginate in *Leptalia*.

The genera may be thus distinguished :—

Tarsi wider, joints 1—3 brush-like beneath.

*PYROTRICHUS.*

Tarsi slender, 1st joint very long ;

Hind tarsi with basal joint sulcate, brush-like at the sides.

*LEPTALIA.*

Hind tarsi with basal joint cylindrical.

*ENCYCLOPS.*

The differences in the tarsi are similar to those observed in the three groups of Lepturini. *Pyrotrichus* being similar to *Stenocorus*, *Leptalia* to the *Toxotus* group, and *Encyclops* to the genuine *Lepturæ*.

To *Leptalia* belongs *Anoplodera macilenta* Mann. a black species from Alaska ; *A. Frankenhæuseri* Mann. is a variety with striped elytra and yellow legs ; *Leptura fuscicollis* Lec., is a larger variety from Vancouver and California, in which the elytra are also striped, and the legs yellow, sometimes varied with black. The reference to *Anoplodera* was singularly inappropriate, since the sides of the prothorax are armed with a rather acute tubercle, almost as in *Centrodera*.

#### Tribe XVIII.—LEPTURINI.

The numerous species composing this tribe are easily recognized by the prominent conical front coxæ, with the cavities angulated externally, open, sometimes almost closed, behind ; middle coxal cavities widely open externally ; the palpi are always unequal, the maxillary elongated, the last joint cylindrical, or triangular, impressed. The head is variable in form, either gradually narrowed behind the eyes, or suddenly and strongly constricted, in either case the neck is long ; the front is slightly declivous, and the antennæ are inserted well in front of the eyes, or slightly between them ; the eyes are oval, longitudinal, or slightly oblique, entire or emarginated. The mandibles are flat, acute, and fringed on the inner margin. The hypostoma is defined by very distinct lateral lines, the mentigerous process is very distinct, and the mentum flat and trapezoidal. The other characters are variable, the antennæ are usually slender, some-

times subserrate; the prothorax is usually wider at base, sometimes tuberculated at the sides; the elytra usually narrowed from the base, sometimes bispinose at tip, sometimes acute and dehiscent, but usually rounded and dehiscent.

The species occur on flowers, are generally prettily colored, and usually clothed with fine pubescence.

A. First joint of hind tarsi with the usual brush of hair beneath (except in certain *Acmopse*).

- |  |                    |
|--|--------------------|
| a. Prosternum prominent between the coxae.   | <i>STENOCORUS.</i> |
| b. Prosternum not prominent, front coxae conical, protuberant; head not suddenly constricted behind. | ( <i>TOXOTI.</i> ) |

Eyes large, coarsely granulated.	<i>CENTRODERA.</i>
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Eyes smaller, coarsely granulated.	<i>XYLOSTEUS.</i>
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Tibial spurs not terminal (eyes variable).	<i>TOXOTUS.</i>
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Eyes finely granulated, tibial spurs terminal;

Prothorax acutely armed on the sides;

Eyes moderate, feebly emarginate.	<i>PACHYTA.</i>
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Eyes large, strongly emarginate.	<i>ANTHOPHYLAX.</i>
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Eyes very small, entire.	<i>PIODES.</i>
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Prothorax obtusely angulated or rounded on the sides; eyes small, entire;

Mesosternum not protuberant.	<i>ACMOPSE.</i>
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Mesosternum protuberant.	<i>GAUROTES.</i>
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B. 1st joint of hind tarsi without brush-like sole; prosternum not prominent; head strongly and suddenly constricted behind; eyes finely granulated, deeply emarginate. (*LEPTURÆ.*)

Last ventral segment of ♂ deeply excavated; body very slender;

Elytra strongly sinuate on the sides; antennæ without poriferous spaces.	<i>BELLAMIRA</i>
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Elytra less sinuate on the sides; antennæ with poriferous spaces on the outer joints.	<i>STRANGALIA.</i>
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Last ventral segment of ♂ not excavated;

Antennæ with large poriferous spaces.	<i>TYPOCERUS.</i>
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Antennæ without poriferous spaces;

Hind coxae not contiguous.	<i>LEPTURA.</i>
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Hind coxae contiguous.	<i>EURYPTERA.</i>
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The type and only species of *Bellamira* is the large and elegant *Leptura scalaris* Say (*Toxotus coarctatus* Hald.) of the Atlantic States.

To *Euryptera* belongs *Lept. lateralis* Oliv. (*distans* Germ.).

*Stenocorus Geoffroy* is equivalent to *Rhagium Fabr.*

## Sub-Family III.—LAMIIDÆ.

The members of this sub-family are usually very easily recognized by (1) the prothorax not being margined; (2) the palpi with the last joint cylindrical and pointed; and (3) the front tibiæ obliquely sulcate on the inner side. One of these characters is occasionally absent, but the other two will then, with the general appearance of the insect, make its affinities unmistakable. To the first character there is no exception in our fauna, and only the *Tmesisternus* group of the other continent; *Michthysoma*, having the last joint of the palpi triangular, is the only exception in North America to the second character; the third character is lost in some genera of low organization, such as *Methia*, *Dysphaga*, which are only feebly differentiated from the *Oeme* group of *Cerambycidæ*.

The front is vertical, usually large and flat, rarely shorter and convex; the eyes are usually finely or moderately finely granulated, rarely quite coarsely granulated; emarginated, frequently divided, sometimes (*Spalacopsis*) with the upper lobe wanting.\* The front coxæ are rounded, never transverse, the coxal fissure is frequently open, so that the cavity becomes angulated, but this character, as in *Cerambycidæ*, is not of great importance; they are closed behind in nearly all, widely open in *Methiini*, with a tendency to become open in *Monohammini*. The middle coxæ are entirely closed by the sternal pieces in the higher forms of each series, open to the side pieces in the others, but this character is also of small importance. The metasternum never has scent glands; and the stridulating organ of the mesonotum is always undivided, though frequently narrow. The ventral segments are always 5, and present no remarkable characters. The legs are usually short, sometimes (*Monohammus* ♂, *Dorcaschema*) long; middle tibiæ with a tubercle or sinus on the outer face in most genera; tibial spurs short; ungues either *divaricate* (extending in a plane at right angles to the length of the last joint), or *divergent* (not in the same plane, but forming an angle). This character, first observed by Lacordaire, seems to be of great value; in the true *Cerambycidæ* the claws do not appear to vary

\* This character has been already noticed in the Clytini, group *Anaglypti*, v. sup. p. 320.

to the same extent, but to be slightly moveable in nearly all, if not all, the species.

I would arrange the tribes represented in our fauna into series, as follows:—

- I. Humeral angles not prominent; metasternum short; wings wanting; front tibiae sulcate. DORCADIOIDES.
  - A. Front large, palpi slender;
    - Support of labrum distinct, coriaceous. DORCADIINI.
    - Support of labrum not visible. MONILEMINI.
  - B. Front short, oblique, palpi dilated. MICHETHYSOMINI.
- II. Humeral angles distinct, wings perfect, elytra entire; front tibiae sulcate;
  - A. Body small, elytra gibbous or spinose near the base; prothorax constricted behind, front large inflexed, unguis divergent. CYRTINOIDES.
    - Front coxal cavities rounded. CYRTINI.
    - Front coxal cavities angulated. PSEPHOCERINI.
  - B. Body elongated, usually large, elytra not gibbous; scape of antennae with an apical cicatrix (except *Dorcascema*), front coxal cavities angulated, sometimes a little open behind; eyes rather finely granulated; (unguis usually divaricate, but variable). LAMIODES.
    - MONOCHAMMINI.
  - C. Unguis divergent.
    - a. Scape of antennae with an open apical cicatrix; front coxal cavities angulated, middle coxae open; eyes finely granulated; body broad. MESOSOIDES.
      - MESOSINI.
    - b. Scape of antennae without cicatrix; front coxal cavities variable, middle coxae open. ONCIDEROIDES.
      - Front large, flat; front coxae angulated. ONCIDERINI.
      - Front convex; front coxae nearly round; eyes very coarsely granulated. ATAXINI.
      - Front inflexed, form very elongate. HIPPOPHINI.
  - D. Unguis divaricate; scape of antennae without cicatrix;
    - a. Front coxae rounded, middle coxae closed or nearly so; form usually stout. ACANTHODEROIDES.
      - Scape of antennae clavate. ACANTHODERINI.
      - Scape of antennae long, slender. ACANTHOCINI.
    - b. Front coxae angulated, middle coxae open. POGONOCHEROIDES.
      - Support of labrum coriaceous. POGONOCHERINI.
      - Support of labrum not visible. DESMIPHORINI.
    - c. Front coxae protuberant, subconical, cavities angulated; middle coxae open externally; eyes very finely granulated; form cylindrical, prothorax never armed, rarely tuberculate on the sides. SAPERDOIDES.

Ungues simple (except the outer one of front and middle tarsi in certain ♂).

SAPRIDIINI.

Ungues cleft or appendiculate.

PHYTOECINI.

III. Humeral angles distinct, wings perfect, elytra abbreviated; front tibiae not sulcate, claws divaricate.

METHIODES.

Front coxal cavities angulated; widely open behind; middle coxal cavities open externally; front short, eyes very large, coarsely granulated; oral organs atrophied.

METHINI.

#### Tribe I.—DORCADIINI.

This tribe, represented by numerous species in the Mediterranean region of the Eastern continent, has but two representatives, *Plectrura* and *Ipochnus*, in our fauna; the former, a brownish insect with rows of shining tubercles on the elytra, which at the apex are prolonged into acute serrated cusps; the sides of the prothorax are armed and serrate; it is found in Oregon, Vancouver, and Alaska. *Ipochnus*, a very convex form, clothed sparsely with long erect hair, with bands of white pubescence on the elytra; the prothorax rounded, not armed; found in the southern part of California.

These two genera represent separate groups, the former, *Dorcadia*, having slender almost pointed palpi, and wide intercoxal process of 1st ventral segment; the latter, *Parmenæ*, having the palpi stouter, last joint oval, obliquely truncate, and the intercoxal process of 1st ventral segment acute.

The tribe is readily recognized by the absence of wings, the consequently short metasternum, and by the elytra having no humeral angles; the large quadrate vertical front; the support of the labrum coriaceous and distinct. The unguis are divaricate, and the last tarsal joint long. The front coxal cavities are widely angulated, closed behind; the middle coxal cavities widely open externally, with distinct trochantin. The eyes are coarsely granulate. Habits epigeal.

#### Tribe II.—MONILEMINI.

These are large species of black color, rarely (*M. albopictum* White) varied with whitish pubescence; the antennæ are, however, always annulate. They are found in the interior region of the continent, extending into Texas and Lower California.

The characters of the tribe are: front large, quadrate vertical, support of labrum not visible; wings none, metasternum short,

elytra without humeral angles; palpi slender, last joint obtusely pointed.

Additional characters are: eyes rather finely granulated, small, deeply emarginate; front coxal cavities rounded, closed behind; middle coxal cavities angulated externally but closed; unguis divaricate, last tarsal joint less elongated than in *Dorcadiini*. Intercoxal process of 1st ventral segment wide.

Mr. James Thomson has established *Omoscyron* on *M. subrugosum* Bland, a species of Lower California in which the prothorax has no lateral spine. The distinction is illusive, as all gradations in the degree of development of the spine are seen, from *M. armatum* where it is large and acute to *M. annulatum* Say, where it is obtuse, and finally to *M. appressum* Lec., and *subrugosum*, where it is wanting.

#### Tribe III.—*MICHTHYSOMINI*.

I have established this tribe on the very anomalous *Michthysoma heterodoxum* Lec., of which I found a single specimen in the mountain region of Georgia. The head is rather large, the front short, scarcely vertical, the support of labrum visible, coriaceous, labrum small, rounded in front. Palpi very unequal, with the last joint securiform. Antennæ slender, as long as the body, scape rather stout, as long as the 3d joint, rounded at tip, without cicatrix; 3d joint not longer than 4th; eyes small elongate, coarsely granulated, lower lobe narrow. Prothorax as wide as the head, with an acute lateral spine, rather in front of the middle. Elytra elongate not wider than prothorax. Intercoxal process of first ventral segment acute.

Front coxal cavities angulated, closed behind; middle ones angulated, closed externally; thighs strongly clavate, front tibiae curved inwards and feebly sulcate, middle ones absolutely without tubercle, sinus, or tuft of hair on the outer margin; tarsi less dilated than usual, 1st joint of hind pair equal to two following united; last joint moderate, claws divaricate.

The form of the palpi seems to show an affinity with the African genus *Phantasis*, but the body is much more elongate, and the other characters do not agree. The head and prothorax are densely punctured and opaque, the elytra more shining, less densely punctured, with hairs proceeding from the punctures.



## Tribe IV.—CYRTININI.

This tribe is represented in the Atlantic States by a single species of *Cyrtinus* (*Clytus pygmæus* Hald.), and is very anomalous in its characters.

The front is large, inflexed, somewhat convex, and the mouth is small; palpi slender, pointed; eyes small, divided, coarsely granulated; antennæ a little longer than the body, scape slender, without apical cicatrix. Prothorax smooth, oval, very convex, constricted at base; elytra with rounded humeri, wider behind, very convex, each with a large acute spine near the scutellum. Wings perfect.

Front coxæ large, rounded, cavities not angulated, closed behind, prosternum scarcely longer in front than behind the coxæ; middle cavities slightly angulated, closed externally; legs stout, thighs strongly clavate, middle tibiæ with a faint sinus on the outer margin; hind tarsi shorter than the tibiæ, 1st joint equal to the two following, last joint rather large; claws apparently moveable, as they are sometimes very widely divergent, and almost divaricate, at others quite near together. The metasternum is very little longer than the 1st ventral segment, and the intercoxal process is acute. This is the smallest Lamiide in our fauna.

## Tribe V.—PSENCERINI.

Also represented by a single very small species of *Psenocerus* in the Atlantic States (*Clytus supernotatus* Say), which resembles a *Saperda* in its form, as much as *Cyrtinus* does a *Dorcadion*.

The characters are nearly the same as in the preceding tribe, except that the front coxæ are angulated externally, and the middle ones open; the middle tibiæ are absolutely without sinus or tuft of hair on the outer margin; the tarsi are wider, and the last joint rather longer, and the claws very widely divergent, though not divaricate.

The front is large and vertical, the support of the labrum coriaceous, the eyes coarsely granulated, divided, the antennæ shorter than the body; scape stouter, and less elongated, without cicatrix, the 3d and 4th joints equal, longer than the others. The prothorax is cylindrical, convex, constricted at base; elytra cylindrical, each with an oval elevation near the scutellum, which is much weaker in small specimens, humeri square. The body

is densely punctured, brown or blackish, with the scutellum, a narrow oblique band composed of two spots about the middle, and a wider transverse one behind the middle not extending to the suture, of white pubescence.

The relations of this and the preceding tribe with the *Anaglyptus* group of Clytini are quite obvious.

#### Tribe VI.—*MONOHAMMINI*.

I have given to this tribe a greater extension than that proposed by Lacordaire, who restricted it to those genera in which the scape of the antennæ has a large cicatrix, limited by a raised line. The relations between *Ptychodes* and *Dorcaschema* are so obvious that they cannot be naturally separated. The tribe as thus enlarged may be defined as follows :—

Front large, vertical, quadrate, flat; genæ long; support of labrum large, coriaceous; mandibles flat; palpi slender, filiform, pointed; eyes somewhat finely granulated, emarginate, lower lobe variable in form. Antennæ longer than the body, very long in the ♂, except in *Goes* and *Cacoplia*, scape rather stout, with a terminal cicatrix, except in *Dorcaschema*. Prothorax with or without a lateral spine, elytra narrowed behind, or cylindrical, wings perfect.

Front coxæ angulated, with distinct trochantin, middle coxal cavities widely open externally; metasternum longer than the first ventral segment (as in all the following tribes); the intercoxal process acute; middle tibiæ with a distinct tubercle on the outer margin; tarsi not elongated, last joint large, claws not fully divaricated, but somewhat moveable as in *Cerambycidae* genuini. The last ventral segment is truncate in both sexes, but more so in the ♀.

Three groups exist in our fauna.

Legs long, the front pair elongated in ♂, and the antennæ much longer than the body;

Prothorax with lateral spines.

*MONOHAMMI.*

Prothorax cylindrical.

*PTYCHODES.*

Legs equal, not elongated.

*GOES.*

#### Group I.—*Monohammus*.

Several species of *Monohammus* represent this group in various parts of the country; they affect the wood of pine trees. The

group is easily recognized by the deeply channelled vertex, very long ♂ antennæ, scape with an apical cicatrix, long slender legs, the front pair much longer in the ♂ ; the lower lobe of the eyes is a little longer than wide. The prothorax has a strong lateral spine.

The last ventral segment in the ♂ is feebly, in the ♀ more strongly, truncate ; the ventral segments are nearly equal in length.

**Group II.—Ptychodes.**

These have also very elongate antennæ, and slender legs, the front pair elongated in the ♂ ; the vertex is deeply and narrowly channelled ; the lower lobe of the eyes is broader than long. The first and 5th ventral segments are longer than the intermediate ones, the last is feebly truncate in the ♂, but more strongly in the ♀. The prothorax is cylindrical.

Our genera are as follows :—

Scape of antennæ with a large well-defined cicatrix ;

Eyes nearly divided.

**PTYCHODES.**

Scape of antennæ without cicatrix ;

Elytra rounded at tip.

**DORCASCHENA.**

Elytra pointed at tip.

**HETOMIS.**

**Group III.—Goes.**

I include in this group Lacordaire's tribe Batocerini, so far as it is represented in our fauna. Neither the difference in the apical cicatrix of the scape of the antennæ, nor the protuberance of the mesosternum seem to me to be of tribal value.

The body is more massive and less elongate than in the preceding groups. The vertex is broadly channelled, the lower lobe of the eyes is long in Goes, transverse in Plectrodera ; the antennæ are but little longer than the body, and not very different in the sexes ; the legs are rather short, equal in length, and not different in the sexes. The ventral segments are nearly equal, and the 5th is more distinctly truncate in the ♀.

Three genera occur in our fauna, all in the Atlantic region :—

Scape of antennæ with a distinctly limited cicatrix

Prothorax cylindrical.

**CACOPLIA.**

Prothorax with a lateral spine.

**GOES.**

Scape of antennæ with the cicatrix not sharply defined ;

Prothorax with a strong lateral spine.

**PLECTRODERA**

## Tribe VII.—MESOSINI.

This tribe has but a single representative, *Synaphæta Guexi*, in California; a rather large, stout insect clothed with gray pubescence; antennæ annulated, prothorax with two black vittæ, and elytra each with two angulated black bands.

The front is large and quadrate, labral support large, coriaceous; vertex deeply channelled; mouth large, palpi slender, pointed; eyes finely granulated, almost divided, lower lobe nearly quadrate; antennæ longer than the body in ♂, shorter in ♀, scape long with an oblique apical cicatrix; prothorax with a very obtuse lateral tubercle just behind the middle; elytra wider than thorax, nearly parallel, depressed on the back, suddenly inflexed at the sides, broadly rounded behind.

Front coxæ angulated, closed behind, with large trochantin; middle coxal cavities open externally; mesosternum protuberant; metasternum a little longer than the 1st ventral; 2-4 segments nearly equal, 5th in ♂ somewhat emarginate, longer, channelled, and more deeply emarginate in ♀. Legs rather short, equal, middle tibiæ without tubercle or sinus on the outer margin; tarsi short, and broadly dilated, claws divergent.

The species of this tribe resemble in appearance the stouter forms of the next two tribes, but differ by the strongly angulated front coxal cavities.

## Tribe VIII.—ACANTHODERINI.

With this tribe commences a long series of genera having the claws divaricate; the front is large, quadrate, vertical, mouth large; support of labrum large, coriaceous; palpi slender; antennæ variable, sometimes excessively long in both sexes, sometimes (sub-tribe Acanthoderini) hardly longer than the body; vertex not much excavated, eyes finely or somewhat coarsely granulated, lower lobe nearly quadrate. Prothorax armed or not on the sides, position of spine variable. Elytra rounded or truncate at tip, usually flattened on the disk, rarely (*Dectes*) cylindrical.

Front coxal cavities rounded, closed behind, usually by a broad corneous space, sometimes (*Dectes*) very narrowly, so as almost to appear open. Middle coxal cavities closed externally; legs moderate, thighs usually strongly clavate, middle tibiæ with a tubercle on the outer margin, hind tarsi sometimes short, sometimes elongated.

Sub-tribes are indicated as follows :—

Scape of antennæ clavate.

ACANTHODERINI.

Scape of antennæ cylindrical, slender.

ACANTHOCININI.

Sub-Tribe 1.—**Acanthoderini.**

The scape of the antennæ is gradually thickened towards the tip, and shorter than the 3d joint, without apical cicatrix. The prothorax is armed with dorsal tubercles, and the lateral spine is large, acute, and situated about the middle; 1st joint of hind tarsi not much longer than the 2d; ventral segments 2–4 shorter in the ♀, 5th broadly emarginate in ♂, rounded in ♀.

I refer all our species to *Acanthoderes*, having the front tarsi of ♂ broader, and fringed with very long hairs. *Ætheopoctines Thomson*, founded upon *A. Morrisii* Uhler, does not seem to be sufficiently distinct; the lower lobe of the eyes is smaller, oblique and oval, rather than quadrate.

In *A. quadrigibbus* the eyes are less coarsely granulated than in the others; it and *A. decipiens* Hald. are referred by Lacordaire to *Psapharochrus Thomson*, but the genera seem to be founded on very feeble characters, and moreover not to be constant even in those differences.

Sub-Tribe 2.—**Acanthocinini.**

The scape of the antennæ is elongate and slender, scarcely thickened at tip, without apical cicatrix. The prothorax is either tuberculate on the disk, or not; the lateral spine is sometimes placed at the middle, sometimes behind the middle, sometimes even very near the base. The genera indicate four groups as follows :—

Lateral tubercle of prothorax about the middle.

LAGOCHIRI.

Lateral tubercle behind the middle;

Prosternum wider behind the coxæ; body flattened above;

♀ without elongated ovipositor.

LIOPH.

♀ with long ovipositor.

ACANTHOCINI.

rosternum very narrow, body cylindrical.

DECTES.

Group I.—**Lagochiri.**

Represented by the Mexican *Lagochirus obsoletus* Thom. which occurs in Lower California; a large, robust insect, with the disk of the prothorax tuberculate, the lateral tubercles very

large; the antennæ are very long, the 6th joint is a little thickened inwards at tip, and from the tubercle thus formed proceeds an acute slender tuft of stiff hairs, resembling a spine. The 1st joint of hind tarsi not elongated, scarcely equal to the 2d and 3d united.

#### Group II.—*Liopt.*

This group is represented by many species in our fauna, all of small or medium size, except one species from Arizona.

The lateral tubercle varies in position from near the middle to the base; in the former position it is very obtuse, but as it moves backwards it becomes more and more acute, and spiniform; the prothorax is feebly tuberculate in some species with obtuse lateral tubercle, and in the same species, the 1st joint of the hind tarsi is not elongated.

The genera may be thus arranged :—

Lateral tubercle submedial; outer joints of antennæ shorter;

1st joint of hind tarsi not elongated; mesosternum truncate;

Body and limbs with long erect hairs; lateral tubercle acute.

*LOPHOPHEUM?*

Pubescent only, lateral tubercle obtuse.

*LEPTOSTYLUS.*

Lateral tubercle of prothorax acute, post-medial; joints of antennæ from 3d nearly equal;

1st joint of hind tarsi as long as 2d and 3d united;

Lateral spine distant from base, body stouter; mesosternum truncate.

*STERNIDIUS.*

1st joint of hind tarsi very long; mesosternum acute behind;

Lateral spine distant from base, antennæ not ciliate beneath.

*LIOPTUS.*

Lateral spine basal or nearly so, antennæ with a few cilia beneath;

Body slender.

*LEPTURUS.*

Body stout, depressed.

*HYPERPLATYS.*

The new genus *Sternidius* is founded upon *Amniscus variegatus* Hald. and allies, contained in division C of my revision, Journ. Acad. Nat. Sci. Phil., 2d ser. ii. 172; it differs from *Leptostylus* only by the characters mentioned in the table.

#### Group III.—*Acanthocini.*

The insects of this group are of medium, or above medium, size, and elongate form; the lateral spine of the prothorax is well developed (though shorter in *Graphisurus*), and is very little behind the middle, except in *Eutessus*, where it is feeble, and near

the base. The antennæ, except in *Graphisurus*, are excessively long in both sexes, densely fringed beneath with soft hair in the ♂, and occasionally with an apical dilatation on the inner side of the 4th (*A. nodosus*), or 5th (*A. spectabilis*) joint. The 1st joint of the hind tarsi is very long, and the last abdominal segment of the ♀ is prolonged into an ovipositor, nearly half as long as the elytra.

Antennæ not much longer than the body;

Pubescence mixed with erect hairs.

GRAPHISURUS.

Antennæ very long in both sexes; pubescence not mixed with erect hairs;

Joints of antennæ 3—11 equal in length.

ACANTHOCINUS.

3d and 4th joints very long, 5—11 shorter than 4th.

EUTESSUS.

The last genus is founded on a very singular insect from Lower California, of which only ♂ specimens are before me. I infer from the general appearance, and sexual characters, that the ♀ must have a long ovipositor. The outline of the prothorax is straight nearly to the base, as in *Liopus*, then armed with a short spine; the elytra are uneven with small elevations, as in certain *Leptostylus*. I have named it *Eu. granosus*.

Our species of *Acanthocinus* lead insensibly to *Eutrypanus*; the two species of the Western slope, *Ædilis obliquus* and *spectabilis* have the sides of the elytra suddenly compressed and declivous, with a distinct carina running from the humeri obliquely backwards; the same thing is observed in a less degree in *A. nodosus*, but very feebly in *Lamia obsoleta* Olivier, which is incorrectly referred by Lacordaire to *Graphisurus*.

#### Group IV.—*Dectes*.

A single genus, with one species in the Atlantic States and one in Texas, constitutes this group. The form is elongate, and cylindrical, the antennæ about one-fourth longer than the body, scape very long, cylindrical, outer joints diminishing slightly in length. The lateral spine of the prothorax is acute, and slender, placed near the base, directed obliquely and horizontally outwards. The elytra are slightly truncate at tip, not wider than the prothorax; the front coxal cavities are separated by the very narrow prosternum, which is not dilated behind; they are closed very narrowly, so that on superficial examination they seem to be widely open, and were erroneously described as such by me;\*

\* Journ. Acad. Nat. Sci. Phila., 2d ser. ii. 144.

the legs are short, the thighs not clubbed, the hind tarsi as long as the tibiæ, with the 1st joint equal to the two following united.

Ventral segments nearly equal; 5th slightly emarginate in both sexes, a little narrower and longer in ♀.

The surface is uniformly finely punctured, and densely clothed with gray pubescence, without elevations or irregularities.

#### Tribe IX.—**POGONOCHERINI.**

This tribe, as here defined, contains species of small size, and usually with long erect (flying) hairs, in addition to the ordinary pubescence. They are related to Acanthoderini, having, like them, the claws divaricate, the body generally rather stout, and the scape of the antennæ without cicatrix; the front quadrate, with coriaceous support to the labrum. They differ in having the scape of the antennæ rather shorter and stouter than in the group Liopi, to which they bear the strongest resemblance; the antennæ are only a little longer or shorter than the body, the outer joints gradually shorter; the eyes are moderately or very coarsely granulated (Eupogonius); the front coxal cavities are angulated externally, completely closed behind; the middle ones are angulated, but not open externally; the legs are short, thighs strongly clavate in some genera, but not so in Eupogonius and Lypsimena; the middle tibiæ have an external sinus in some genera, and are quite simple in others; the 1st joint of hind tarsi short or only slightly elongated.

The genera of this tribe are dispersed by Lacordaire among his groups, Estolides, Apodasyides, and Pogonocherides; with the exception of Hoplosia?, which resembles a Graphisurus, with the antennæ of Acanthoderes, the genera have a characteristic habitus.

Three groups are indicated:—

Middle tibiæ with an external sinus; thighs clavate;

Eyes more finely granulated, lower lobe elongate.

**ESTOLÆ.**

Eyes less finely granulated, lower lobe not elongate.

**POGONOCHERI.**

Middle tibiæ absolutely simple; thighs not clavate;

Eyes very coarsely granulated.

**EUPOGONII.**

#### Group I.—**Estolæ.**

To this group I would refer *Pogonocherus nubilus* Lec., Proc. Acad. Nat. Sci. Phila., 1862, 39. The eyes are rather finely granulated, the lower lobe elongate; the scape of the antennæ



stout, clavate, much shorter than the 3d joint. The lateral spines of the prothorax are large and situated at the middle; there are no dorsal tubercles. The pubescence is gray mottled with black, and there are short, scattered, erect hairs on the elytra; the antennæ are thinly fringed beneath with hairs. The thighs are strongly clavate, and the sinus of the middle tibiæ is distinct; the 1st joint of the hind tarsi is scarcely longer than the 2d. The 5th ventral segment is much larger in ♀, and subtruncate in both sexes.

This insect indicates a genus, which is perhaps identical with the European *Hoplosia*. The mesosternum is parallel and truncate behind; the prosternum in front of the coxæ is well developed and not declivous, so that the head is not retractile.

Group II.—*Pogonocheri*.

The eyes are not coarsely granulated, the lower lobe subquadrate or subtriangular, not elongate; the scape of the antennæ is stout, though less clavate than in the preceding group, and they are fringed with long flying hairs; the prothorax is either armed or not, and has faint dorsal tubercles. The body and legs are clothed with long flying hairs, and tufts of hair are seen on the elytra in *Pogonocherus*, but in *Ecyrus* the pubescence is short and close, with a few erect, short hairs proceeding from rows of granules on the elytra, which are carinate on the sides in both genera, sometimes truncate, sometimes rounded at tip. The 5th ventral segment is larger in the ♀, and truncate in both sexes. The thighs are clavate, the middle tibiæ have a small but distinct tubercle on the outer margin;\* the hind tarsi are short, with the 1st joint equal to the 2d.

Two genera occur in our fauna.

Flying hairs long; prothorax with lateral spines.

*POGONOCHERUS*.

Prothorax with feebly rounded sides, pubescence short.

*ECYRUS*.

The second genus resembles in appearance a small *Mesosa*, but differs essentially in the claws being absolutely divaricate, and fixed in position.

\* Lacordaire states that the middle tibiæ are simple.

Group III.—*Eupogonini*.

The eyes are very coarsely granulated, with the lower lobe not transverse, they are larger in *Lypsimena* than in *Eupogonius*; antennæ not longer than the body, scape feebly clavate, shorter than 3d joint; clothed with long flying hairs in *Eupogonius*, sparsely ciliate beneath in *Lypsimena*; prothorax densely punctured, without dorsal tubercles, armed on the side with a small acute spine; elytra sparsely punctured, with irregular mottlings of yellowish pubescence in some species, with only erect hairs in *Eu. subarmatus*. Body and legs clothed with erect hairs, which are usually very long, but shorter in the species just mentioned. Legs short, equal, middle tibiæ without sinus or tubercle; 1st joint of hind tarsi a little longer than the 2d. Last ventral rounded at tip, larger in ♀ than ♂.

*Eu. subarmatus* bears a deceptive resemblance to *Amphionycha*, and the first specimen which I obtained being mutilated, was described as belonging to that genus, from which it is abundantly distinct by the coarsely granulated eyes, and entire unguis.

Body with flying hairs;

Antennæ pilose, joints 5—10 shorter, equal.

*EUPOGONIUS.*

No flying hairs;

Antennæ sparsely ciliate beneath, outer joints very gradually shorter, prothorax unarmed.

*LYPSIMENA.*

My specimen of the second genus is imperfect, so that the form of the middle coxal cavities cannot be observed; Lacordaire states that they are open. The very coarsely granulated eyes induce me to believe that its strongest affinity is with *Eupogonius*.

Tribe X.—*DESMIPHORINI*.

The occurrence of *Desmiphora mexicana* Thomson in Texas requires the introduction of this tribe into our fauna. The front is large, the support of the labrum is *not visible*, and the labrum itself is of peculiar form, the basal half is densely pubescent, and the apical half obliquely truncate, presenting an obliquely declivous oval surface, which is finely carinated; the mandibles are large and the head is bent down to touch the prosternum. The eyes are coarsely granulated. The prosternum is short, prominent between the coxæ, and very declivous before and behind. The prothorax is armed with a strong lateral spine. The elytra

are parallel and cylindrical, rounded at tip. The front coxæ are angulated externally and closed behind. The mesosternum is protuberant and perpendicular in front; the middle coxæ are angulated, but scarcely open externally. The 5th ventral segment (in ♀) is as long as the three preceding united, and truncate at tip. The legs are short, equal, the thighs not clavate, the middle tibiæ sulcate externally, with a slight protuberance; 1st joint of hind tarsi not longer than the 2d; claws divaricate.

The antennæ (♀) are two-thirds the length of the body, and pilose, the scape rather stout, scarcely clavate, joints 4-11 gradually, but rapidly decreasing in length.

This insect is remarkable for being covered with very dense brown pubescence, with lines and crests of very long, fine whitish hairs looking like mould. Beneath it is very prettily variegated with darker spots each surrounded with a white line. Length 15 mm. The only specimen I have seen was sent from Texas to Mr. A. S. Fuller, and given me by Dr. Horn.

#### Tribe XI.—ONCIDERINI.

With this tribe commences a series in which the front coxal cavities are angulated externally and closed behind, the middle ones open externally, and the claws moderately divergent. The antennæ in the present tribe are longer than the body in the ♂, about as long as the body in the ♀, and the scape is stouter, subcylindrical, nearly as long as the 3d joint, and has no apical cicatrix. The front is very large, quadrate, vertical, and flat, the support of the labrum coriaceous, the mouth large, the palpi slender, last joint cylindrical, obtusely pointed. The prosternum is very short in front of the coxæ, prominent between them, declivous before and behind; mesosternum truncate between the coxæ. Ventral segments equal in length, 5th broadly emarginate in both sexes, and impressed in the ♀. Legs rather stout, equal; thighs moderately clavate, middle tibiæ with a tubercle on the outer margin, hind tarsi with the 1st joint broad, not longer than the 2d, last joint as long as the others united, claws approximate, slightly divergent.

*Oncideres cingulatus* is remarkable for placing the eggs in small branches of trees, especially hickory, and then cutting through the bark below, so as to kill the branch, which is after-

wards broken off by the wind;\* it will be remembered that *Elaphidion villosum* has the same curious habit.

Eyes not very finely granulated, lower lobe elongate;

Antennæ slender in both sexes, vertex flat.

ONCIDERES.

Eyes very finely granulated, lower lobe not elongate;

Antennæ with joints 1—4 thickened and hairy in ♂; vertex deeply concave.

TARICANUS.

The first genus is represented by one species in the Atlantic States, and two in Texas and Arizona; the second by *T. Truquii* Thoms., a Mexican species which occurs in Texas.

### Tribe XII.—ATAXINI.

Is represented in our fauna by *Ataxia crypta* (Say), (*A. sordida* Hald.),† a slender insect densely clothed with mottled brown and white pubescence, and remarkable for having the punctures of the elytra arranged in rows, from which proceed black sub-erect hairs.

The antennæ are as long as the body, slender, annulated, scape stouter, as long as the 3d joint; joints from the 3d diminishing very slightly in length. Front convex, rather broader than long, support of labrum coriaceous, mouth moderate in size, genæ very short; palpi slender, last joint acute. Prothorax as long as wide, with a small, acute, lateral spine; elytra a little wider than the prothorax, cylindrical, rounded or subtruncate at tip. Front coxæ angulated, closed, prosternum not abbreviated in front; mesosternum truncate between the coxæ, cavities angulated, but scarcely open externally. Ventral segments, 1st and 5th a little longer, 5th truncate at tip. Legs moderate, thighs feebly clavate, middle tibiæ without tubercle, hind tarsi with 1st joint nearly as long as the two following, last joint as long as the first, ungues approximate, divergent.

Specimens from the Southern States and Texas have the elytra obliquely subtruncate, and the hairs longer; in those from New Mexico the elytra are almost rounded at tip, and the hairs are shorter. I do not think these differences are of specific value.

\* Haldeman, Trans. Am. Phil. Soc. x, 52.

† Erichson considered this insect as *Saperda annulata* and *lineata* Fabr., described from South America. Vide Lacordaire, ix, 599.

Tribe XIII.—HIPPOPSINI.

The body is extremely slender, the antennæ very long in the first group, short in the others; the front is very long and inflexed, so that the mouth is near to the prosternum; it is small, and the mandibles are nearly perpendicular to the inflexed front; the support of the labrum coriaceous, the palpi not slender and the last joint almost conical and pointed. The eyes are coarsely granulated, emarginate or divided, in the latter case, the upper lobe is sometimes (*Spalacopsis*) wanting. Prothorax long, cylindrical; elytra elongate. Front coxæ angulated in *Hippopsis*, rounded in the others, closed behind, middle ones open externally, mesosternum truncate between the coxæ. Ventral segments nearly equal, the 1st sometimes longer, 5th broadly truncate. Legs rather short, equal, middle tibiæ with an external tubercle, tarsi as long as the tibiæ, 1st joint of hind pair short, or slightly elongated (*Hippopsis*), last joint rather long, claws divergent.

Our three genera indicate different groups.

Front coxæ angulated;

Antennæ very long.

HIPPOPSIS.

Front coxæ rounded; antennæ short;

Antennæ very pilose, scape not longer than 3d joint; head not elongated, eyes emarginate, upper lobe narrow.

DORCASTA.

Antennæ sparsely pilose, scape very long; head as long as prothorax, eyes divided, upper lobe wanting.

SPALACOPSIS.

*Dorcasta Pascoe* is equivalent to *Ægilopsis Horn*, and one species, *D. cinerea* Horn, occurs in Texas.

*Spalacopsis* occurs in Florida and Texas; *Eutheia* || Guer., *Euthuorus* Duval, was established upon a Cuban species, differing from ours by the antennæ much more hairy, and the scape somewhat longer. These differences do not seem to be generic.

Tribe XIV.—SAPERDINI.

Insects of cylindrical form, of large or medium size, with large, flat, quadrate, vertical front, coriaceous labral support, and finely granulated, deeply emarginate eyes. The palpi are less slender than in the *Acanthoderoid* series, the last joint more or less oval, truncate at tip. The antennæ are as long as the body, or a little shorter; the scape is nearly cylindrical, a little shorter than the 3d joint, without apical cicatrix; the outer joints

scarcely diminish in length. The prothorax is cylindrical, entirely unarmed, and without tubercles; the elytra are wider than the prothorax, cylindrical, usually rounded at tip, rarely (*calcarata*) the suture is armed with a spine, or (*obliqua*) the tip is attenuated and acuminate.

The front coxæ are angulated externally with distinct trochantin, and closed behind; the middle coxal cavities are angulated, open externally, with distinct trochantin. The prosternum is very narrow between the coxæ, and the mesosternum acute behind. The side pieces of the metasternum are very broad in front, and narrowed behind; a character not seen in the preceding tribes. The ventral segments are nearly equal, the 5th somewhat longer, somewhat truncate (♀) or emarginate (♂). Legs moderate, nearly equal, thighs not clavate, middle tibiæ without tubercle or sinus; hind tarsi with 1st joint not much elongated; last joint rather short in general, claws divaricate; the inner one of the front and middle pair in the ♂ of most of our species armed with a rounded lobe or tooth, which is wanting in *S. moesta*, and *concolor*, and in the European species.

The genus *Saperda* alone is represented in our fauna. Thus far, none have been found on the Pacific slope, except *S. moesta*, a northern species, which extends from Canada to Oregon.

Some of the species are very destructive to cultivated trees, boring into the wood, or destroying the subcortical tissues of the roots.

#### Tribe XV.—PHYTCEINI.

This tribe contains all those species in which the claws are similar, appendiculate or cleft in both sexes; except in *Phæa* and *Oberea* the claws are divergent; in the last named genus they are divaricate in the front tarsi, and either divergent or divaricate (*O. Schaumi*) on the hind pair; in *Phæa* they are divaricate on all the tarsi.

The front is moderately convex, broader than long, the eyes are finely granulated, emarginate or divided; palpi slender, last joint elongate oval, nearly pointed; antennæ shorter, or at most not longer than the body, scape cylindrical, more slender and shorter than 3d joint (*Oberea*), stouter and nearly equal to 3d joint in the others. Prothorax cylindrical, or obtusely tuberculate on the sides; elytra cylindrical, rounded or truncate at tip.

Front coxæ conical, protuberant, cavities angulated, closed behind, separated by very narrow prosternum; middle coxæ open externally, episterna and epimera separate (*Mecas*, *Oberea*, *Tetraopes*), or nearly connate (*Tetrops*, *Amphionycha*). Ventral segments nearly equal in our genera, 5th more or less different in the sexes, and usually somewhat longer in ♀. Legs short, thighs not clavate, middle tibiæ simple, hind tarsi with 1st joint not elongated, last joint rather long; claws variable in position as above stated, always appendiculate or cleft.

The side pieces of the metathorax are narrower behind; they are rather wide (as in *Saperdini*) in the first group, but less developed in the others.

The genera seem to indicate several groups, but without study of the foreign forms it is unnecessary to define them at present, and I have included them in a single table.

Episterna of metathorax wide;

Epipleuræ indistinct; unguis feebly toothed or cleft.

*MECAS.*

Epipleuræ distinct; unguis broadly appendiculate.

*OBEREA.*

Episterna of metathorax moderate;

Eyes broadly divided; prothorax dilated on the sides;

Unguis broadly appendiculate.

*TETROPS.*

Unguis cleft.

*TETRAOPES.*

Eyes not divided; unguis cleft.

Antennæ pilose, outer joints suddenly shorter.

*AMPHIONYCHA.*

The American species of *Tetrops* are referable to *Phæa Newman*, which seems not sufficiently distinct from the European genus to be retained in a natural classification.

The species of *Tetraopes* are numerous and very similar, being of a bright red color with small black spots on the prothorax and elytra; they live exclusively upon plants of the genus *Asclepias*.

#### Tribe XVI.—*METHIINI*.

This tribe contains the lowest organized of the *Lamiidæ*; undifferentiated forms, which exhibit strong relationships to *Oeme* and its allies among the *Cerambycidæ*.

The body is elongate, the prothorax cylindrical, the elytra shorter than the abdomen, separately rounded at tip, and the wings are extended along the dorsum of the abdomen, and very imperfectly folded at tip.

The eyes are sparsely pilose, very large, coarsely granulated,

deeply emarginate; less coarsely granulated and divided in *Dysphaga*; the front short and perpendicular, labrum obsolete, or connate; mandibles short, but very stout at base, and trigonal; palpi unequal, short, and cylindrical, the labial nearly pointed, the maxillary truncate, with a terminal oval cicatrix or mamilla representing the last joint in *Methia*; still more feeble and nearly atrophied in *Dysphaga*. The prosternum is elongate in front of the coxæ, which are conical and prominent; the cavities are *confluent*, separated behind by a very narrow point of prosternum, widely angulated externally and *open behind*. Middle coxæ conical, prominent, contiguous, cavities confluent, widely open externally; hind coxæ nearly contiguous, also prominent. Ventral segments equal in length, cylindrical in *Styloxus*, with the 5th broadly emarginate, and 6th visible; of softer consistence, 5th longer with a large hairy vulva-like excavation in three (♂) specimens of *Methia* before me; flat with the segments imbricate at the sides (as in *Lampyridæ*) in *Dysphaga*, 5th joint deeply emarginate in ♀, longer in ♂, with the same vulva-like excavation as in *Methia*, but broader and patulous, so as to become triangular; the abdomen is black in ♀ but yellow in ♂ of *Dysphaga*.

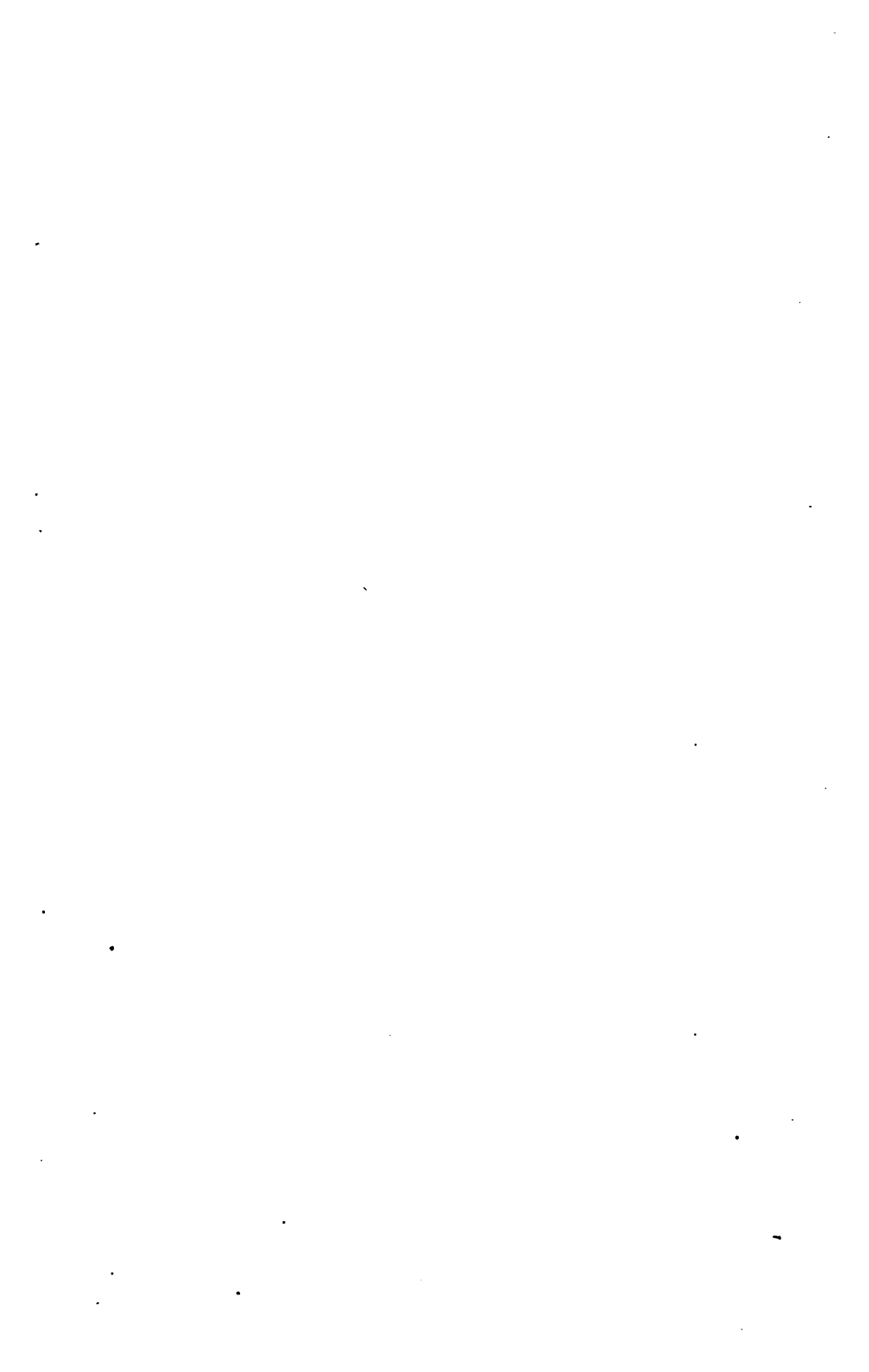
The legs are moderate in *Styloxus*, with the thighs clavate; more slender, with the thighs not clavate in *Methia*; very feeble in *Dysphaga*; the tarsi are short, and the last joint is as long, or nearly so, as the others united; the claws are small and divaricate.

The antennæ are longer than the body in both sexes; pilose in *Methia*, sparsely ciliate in the other two genera. The scape is short in *Styloxus* and *Dysphaga*, and is armed at tip with a stout spine in the former; it is longer and more slender in *Methia*; the 2d joint is distinct in *Styloxus*, but obsolete in *Methia* and *Dysphaga*, so that only ten joints are visible.

*Methia pusilla* Newman, occurs in the Southern States; *Dysphaga tenuipes* (♂ ventralis) Hald., in Pennsylvania, in hickory twigs, *D. lævis* Lec., in Illinois; they are similar in size and form, but the prothorax is coarsely and densely punctured in *D. tenuipes*, while it is shining and only sparsely punctured in *D. lævis*.

*Styloxus* is founded on a species from Lower California, somewhat larger than *Methia pusilla*, but also of a uniform brown color. I have named it *S. lucanus*.









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